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BOTANY.—*Studies in the Begoniaceae*, III.[1]

LYMAN B. SMITH, Department of Botany, U. S. National Museum, and BERNICE G. SCHUBERT, Gray Herbarium of Harvard University.

The present miscellany of notes and novelties is written as an addendum to a floristic treatment of the family already made, *The Begoniaceae of Colombia*[2], and as a preface to further floristic papers.

MEXICO

Begonia boissieri A. DC. in Ann. Sci. Nat. IV. **11**: 126. 1859; in DC. Prod. **15**[1]: 311. 1864. FIGURE 1, *a*

Begonia suffruticosa Pav. ex A. DC. in DC. Prod. **15**[1]: 311. 1864, nomen in synon.

Type in the Herbier Boissier, collected at an unknown locality in Mexico, presumably by Sessé and Mociño. Macbride photo no. 8517.

GUERRERO: In granitic soil on mountainside beside a swift stream, mixed pine and cacti, 25 miles south of Chilpancingo, August 16, 1947, *Paxson, Webster, & Barkley* 17M806 (GH); in loose granitic cliff 3 miles north of Taxco, August 21, 1947, *Paxson, Westlund, & Barkley* 17M881 (GH); moist shaded bank, juniper- and oak-wooded slopes above and east of Taxco on trail to Chacualco, altitude 1,740–1,860 meters, August 18, 1948, *Moore & Wood* 4615 (GH).

A. De Candolle indicated the origin of *Begonia boissieri* as possibly Mexico and later added Peru. As we have pointed out in connection with *B. monophylla* Pav.,[3] the confusion arises from Pavon's having collected in Peru himself but having acquired collections of Sessé and Mociño from Mexico and leaving them inadequately labeled. The above recent material proves that the species is Mexican.

As noted in the Prodromus, *B. boissieri* is related to *B. falciloba* Liebm. and *B. bulbillifera* Link and Otto. It differs from *B. falciloba* in its shallowly undulate-lobate leaves and from *B. bulbillifera* in having peduncles and in its deciduous brownish stipules.

Begonia hidalgensis Smith & Schubert, sp. nov. FIGURES 1, *b–g*

Subacaulis; foliis asymmetricis, transverse ellipticis; scapo elato; inflorescentia inaequaliter cymosa, multiflora; tepalis masculinis 2, orbicularibus; staminibus liberis, antheris obovoideis; tepalis femineis 5, ellipticis, acutis; capsula inaequaliter trialata.

Stem short and repent with the scapes and leaves borne at its apex, 1 cm. thick, internodes very short; leaves palmately 7-nerved, transversely elliptic with an oblique acuminate apex and often with short cusps at the ends of the principal nerves, 7–12 cm long, glabrous above, dark-puberulent beneath, especially on the reddish nerves, petioles suberect, slender, to 17 cm long, densely brown-puberulent, stipules persistent, imbricate, subtriangular, 15 mm long, entire, acuminate-setiferous from a strong midnerve, dark brown; peduncles much exceeding the leaves, up to 55 cm long, puberulent when young; cymes many-flowered, irregular with one side distinctly longer, densely puberulent; bracts deciduous, small, elliptic, entire, thin; staminate tepals 2, orbicular, 5 mm long, entire, minutely puberulent, yellowish white (! Moore); stamens few, free, anthers obovoid, emarginate, slightly shorter than the filaments; pistillate bracteoles very quickly deciduous, not seen; pistillate tepals 5, elliptic, acute, 2.5 mm long, entire, minutely puberulent; ovary 3-celled, placentae bifid, styles bifid; capsule suberect, ovoid, wings unequal, ovate, ascending, at least the largest acute, 5–10 mm wide.

[1] Received May 15, 1950. The two previous numbers in this series are: *Studies in the Begoniaceae, I*, Contrib. Gray Herb. **154**: 23–31. 1945; *Studies in the Begoniaceae, II*, Contrib. Gray Herb. **159**: 26–29. 1946.

[2] Contrib. Gray Herb. 164, in Caldasia **4**: 3–38, 77–107, 179–209. 1946.

[3] Contrib. Gray Herb. **127**: 26. 1939.

Type in the Gray Herbarium, collected in the shade of a large tree, *Liquidambar* woods, Puerto del Zopilote, near Kilometer 329 on the highway north of Jacala, Chapulhuacan, District of Jacala, State of Hidalgo, Mexico, altitude 1,140 meters, April 28, 1947, by H. E. Moore, Jr. (no. 2707). Staminate and pistillate flowers.

Cotypes in the Gray Herbarium and in the U. S. National Herbarium, collected on a rocky ledge, near the Hidalgo line at Kilometers 343–344 on the highway north of Chapulhuacan, District of Jacala, State of Hidalgo, Mexico, altitude 630 meters, May 9, 1947, by H. E. Moore, Jr. (no. 2877). Pistillate flowers and fruit. In its habit, leaves, and irregular cymes, *Begonia hidalgensis* somewhat resembles *B. plebeja* Liebm., but it differs in many details such as its thin inconspicuously nerved stipules and five acute pistillate tepals. Nor does *B. hidalgensis* show close relationship with any other Mexican species.

Begonia pudica Smith & Schubert, sp. nov. FIGURES 1, *h–k*

Herbacea, repens; foliis longepetiolatis, obliquis, late ovatis, stipulis tenuiter nervatis, cymis perpaucifloris, a foliis superatis et obtectis; tepalis masculinis 4; antheris obovoideis; tepalis femineis 2; alis capsulae valde inaequalibus.

Herbaceous, repent; rhizome 8 mm thick, internodes very short; leaves overtopping and presumably concealing the inflorescence, oblique, broadly ovate, short-acuminate, cordate at base, 10–18 cm long, 6–13 cm wide, shallowly undulate-lobed, obscurely ciliate-dentate, sparsely setose on both sides, more or less variegated along the nerves above, petioles erect, 16–31 cm long, sparsely pilose with simple trichomes, stipules deciduous, broadly ovate, entire, thin, glabrous, without obvious nerves; peduncle erect, slender, nearly glabrous; inflorescence bisexual, 3-flowered with a basal solitary flower and paired flowers on a short branch, glabrous; bracts deciduous, very broadly ovate, 3–4 mm long, entire, thin; pedicels 5–21 mm long, flowers pink; staminate tepals 4, the outer suborbicular, 13–20 mm long, the inner broadly elliptic, much smaller; stamens free, numerous, filaments elongate, anthers obovoid; pistillate tepals 2, like the outer staminate ones; ovary 3-celled, placentae bilamellate, ovuliferous throughout; styles persistent, bifid, the stigmatic tissue linear, spiral, continuous; capsule erect, ellipsoid, 13 mm long, wings very unequal, the largest ovate, obtuse, 13 mm wide, the others sublunate.

Type in the U. S. National Herbarium, no. 462313, collected at Barranca Trinidad, below Honey Station, State of Hidalgo, Mexico, September 9, 1906, by C. G. Pringle (no. 10305). Duplicate in Gray Herbarium.

The relationship of *Begonia pudica* is obscure. It appears superficially much like *B. violiaefolia*, but differs in most details most notably in its glabrous tepals and erect capsule.

PANAMA

Begonia davidsonae Standley ex Smith & Schubert, sp. nov. FIGURES 1, *l–o*

Acaulis; rhizomate repente; internodiis brevissimis; foliis oblique lateque ovatis; inflorescentia regulariter cymosa; tepalis masculinis femineisque 4; braceteolis femineis orbicularibus, integris; alis capsulae valde inaequalibus.

Stemless with the leaves clustered near the apex of the short prostrate densely rooting rhizome, glabrous, internodes very short; leaves oblique, broadly ovate, abruptly acuminate and also cuspidate at the ends of the principal nerves, deeply and narrowly cordate at base, 10 cm long, 7 cm wide, petioles slender, 17 cm long, stipules deciduous, triangular-ovate, acuminate, 12 mm long, lacerate toward the apex, thin; peduncles slender, to 26 cm long, exceeding the leaves; cymes regular, few-flowered, dense; bracts quickly deciduous; flowers white or pink (! Davidson); staminate tepals 4, entire, the outer suborbicular, 12 mm long, the inner elliptic, 10 mm long; stamens numerous, anthers obovate, much shorter than the filaments, connective not produced; pistillate bracteoles orbicular, entire; pistillate tepals 4, like the staminate but smaller; stigmatic tissue spiral, wings of the ovary very unequal, the largest oblong, obtuse, much wider than high, the others narrowly marginiform.

Type in the Missouri Botanical Garden, collected in rain forest, at Bajo Chorro, Boquete District, Province of Chiriquí, Panama, altitude 1,800 meters, January 5, 1938, by M. E. Davidson (no. 38). Duplicate in U. S. National Herbarium.

The above species appears to be related to *Begonia brevicyma* C. DC. and *B. mucronistipula* C. DC. but differs from them in having pistillate bracteoles and four pistillate tepals instead of two or three.

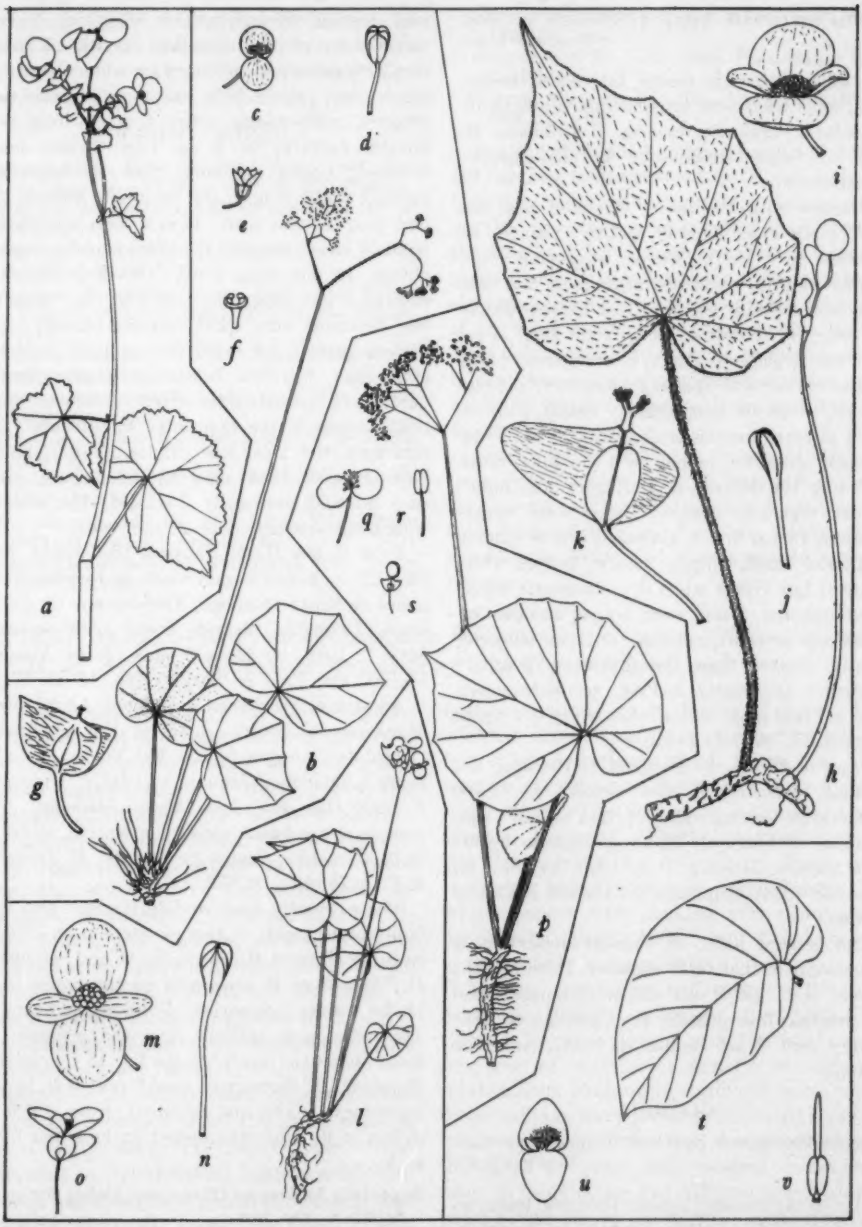

FIG. 1.—*a*, *Begonia boissieri*, inflorescence and upper leaves × ½. *b*, *Begonia hidalgensis*, plant × ⅛; *c*, staminate flower × 1; *d*, stamen × 5; *e*, pistillate flower × 1; *f*, style × 5; *g*, capsule × 1. *h*, *Begonia pudica*, plant × ⅛; *i*, staminate flower × 1; *j*, stamen × 5; *k*, capsule × 1. *l*, *Begonia davidsoniae*, plant × ⅛; *m*, staminate flower × 1; *n*, stamen × 5; *o*, pistillate flower × 1. *p*, *Begonia quaternata*, plant × ⅛; *q*, staminate flower × 1; *r*, stamen × 5; *s*, pistillate flower × 1. *t*, *Begonia thermarum*, leaf × ⅛; *u*, staminate flower × 1; *v*, stamen × 5.

Begonia quaternata Smith & Schubert, sp. nov. FIGURES 1, *p–s*

Acaulis; rhizomate erecto, internodiis brevissimis; foliis transverse latissimeque ellipticis; inflorescentia regulariter cymosa, 3–4-radiata; tepalis masculinis femineisque 2; alis capsulae aequalibus.

Stemless with the leaves clustered near the apex of the erect densely rooting rhizome, internodes very short; leaves transverse, very broadly elliptic, obliquely acuminate and also cuspidate opposite the principal nerves, deeply and narrowly cordate at base, 17 cm long, 14 cm wide, nearly glabrous above, below densely pilose on the nerves and sparsely elsewhere, petioles slender, 15–18 cm long, densely vestite with reflexed lacerate fuscous scales, stipules early deciduous, unknown; peduncles 4 dm long, much exceeding the leaves, slender, glabrous; inflorescence regularly cymose, 3–4-radiate, many-flowered, 13 cm broad, glabrous; bracts quickly deciduous, small, elliptic, entire; flowers white (! Allen) but yellow when dry; staminate tepals 2, suborbicular, 5 mm long, entire; stamens inserted on a short column, anthers ellipsoid, slightly shorter than the filaments; pistillate bracteoles apparently lacking; pistillate tepals 2, to 2.5 mm long; styles bifid, ovary 3-winged, wings equal, broadly ovate.

Type in the U. S. National Herbarium, no. 1820034, collected in the vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, Province of Chiriquí, Panama, altitude 1,800–2,000 meters, January 6–14, 1939, by Paul H. Allen (no. 1336). Duplicate in Missouri Botanical Garden.

The general habit of *Begonia quaternata* is reminiscent of that of *B. stigmosa*. However, the flowers of *B. quaternata* are much smaller, and its cyme has four primary rays, a character that is very rare if not unique in North American *Begonia*.

COLOMBIA

Begonia thermarum Smith & Schubert, sp. nov. FIGURES 1, *t–v*

Herbacea, ramosa; laminis foliorum transversis, obscure denticulatis; pedunculis brevibus; cymis paucifloris; tepalis masculinis 4: connectivo antherarum ultra loculos perlonge extenso.

Shrubby herb with branches 2 m long (! Scolnik, Molina, & Barkley), completely glabrous, axes straight, strongly sulcate when dry, leaves transversely elliptic, apiculate, cordate at base, pinnately nerved, 9 cm long, 5 cm wide, obscurely denticulate, petiole 5–10 mm long, stipules deciduous, ovate-oblong, entire, 6–9 mm long; peduncles axillary, to 3 cm long; cymes few-flowered; bracts deciduous, like the stipules; pedicels 8 mm long in the staminate flowers, 25 mm long in the fruit; flowers red; staminate tepals 4, very unequal, the outer broadly ovate, obtuse, 10 mm long, fleshy, the inner broadly elliptic, 2 mm long, thin; stamens free, numerous, filaments very short, anthers oblong, connective greatly produced into a long caudate appendage; pistillate bracteoles elliptic, finely denticulate, exceeding the ovary, deciduous; pistillate tepals 3, the two outer suborbicular, 25 mm long, the inner one elliptic, 12 mm long, paler; styles 3, bifid; placentae bilamellate; capsule ellipsoid, unequally 3-winged, the largest wing ovate-triangular, 15–20 mm wide.

Type in the U. S. National Herbarium, no. 1985327, collected in rain forest at Fuentes Termales de Santo Domingo, Department of Antioquia, Colombia, altitude about 1,200 meters, May 7, 1949, by Rosa Scolnik, Jorge Araque Molina, and Fred A. Barkley (no. 19 An 474).

Additional specimens examined: ANTIOQUIA: Municipio of Sonsón, head of the Quebrada "Curubital," region of the Río Verde, altitude 1,430–1,500 meters, January 24, 1947, *G. Gutiérrez V.* 1236 (Hb. Fac. Nal. Agron. Medellín). On rocks in dense forest, vicinity of Nariño, altitude ca. 1,760 meters, August 20, 1948, *W. M. Johnson & F. A. Barkley* 18C832 (US).

The extremely long-caudate stamens and red fleshy outer tepals of *Begonia thermarum* closely resemble those of *B. extensa* Smith and Schubert. It differs from *B. extensa* in its transverse leaf-blades, short peduncles, few-flowered cymes, short staminate pedicels, and the presence of inner staminate tepals. In the key to Colombian *Begonia*,[4] *B. thermarum* would fall next to *B. cryptocarpa* Smith and Schubert, from which it differs in its long-appendaged anthers and bifid styles.

Begoniella kalbreyeri Oliver var. **glabra** Smith & Schubert, var. nov.

A var. typica differt planta omnino glabra.

Differs from the typical variety in being completely glabrous.

[4] Caldasia **4**: 198. 1946.

Type in the U. S. National Herbarium, No. 1857260, collected at Jericó, Department of Antioquia, Colombia, December 1940, by Brothers Daniel and Tomás (no. 3501).

TROPICAL AMERICA

Begonia patula Haw. Pl. Succ. Suppl. 100. 1819; in Walp. Repert. Bot. Syst. **2**: 215. 1843.
Begonia pauciflora Lindl. in Bot. Reg. **6**: *pl. 471*. 1820.
Begonia obliqua Vell. Fl. Flum. Icones **10**: *pl. 48*. 1827, not L. 1753.
Begonia populifolia sensu Liebm. in Kjoeb. Vidensk. Meddel. **1852**: 16. 1853, not Schott, 1827.
Begonia tovarensis Kl. Abh. Akad. Wiss. Berlin **1854**: 31. 1855.
Begonia moritziana Kl. Abh. Akad. Wiss. Berlin **1854**: 31. 1855.
Begonia pohliana Kl. Abh. Akad. Wiss. Berlin **1854**: 33. 1855.
Begonia malvacea Kl. Abh. Akad. Wiss. Berlin **1854**: 33. 1855.
Begonia parvifolia Kl. Abh. Akad. Wiss. Berlin **1854**: 33. 1855, not Schott, 1827.
Begonia brasiliensis Kl. Abh. Akad. Wiss. Berlin **1854**: 34. 1855.
Begonia macroptera Kl. Abh. Akad. Wiss. Berlin **1854**: 34. 1855.
Begonia elata Kl. Abh. Akad. Wiss. Berlin **1854**: 35. 1855.
Begonia uliginosa Kl. Abh. Akad. Wiss. Berlin **1854**: 35. 1855.

In the course of determining a series of Brazilian begonias from the Instituto Miguel Lillo, we have been faced with the problem of distinguishing the numerous species proposed by Klotsch in the vicinity of his *B. tovarensis*. The variation in single plants is so great that we feel convinced the names listed above represent merely forms or at the most varieties of a single species. At the same time we find the name *B. tovarensis*, which we had been using for this species covering practically all tropical America, is far antedated by *B. patula* Haworth.

Begonia patula appears to be one of the very few species that has arisen in eastern Brazil and then spread far beyond. Its origin is attested by such close relatives as *B. setosa*, *vellerea*, and *subvillosa* in Brazil and their complete absence elsewhere.

ENTOMOLOGY.—*Notes on* Brontispa *in Micronesia (Coleoptera, Chrysomelidae)*.[1]

H. S. BARBER, Bureau of Entomology and Plant Quarantine.

Publications on injury to coconut palms by the leaf-bud infesting beetles of the genus *Brontispa* (Hispinae) record the pests under various names, some of them apparently misapplied. Although inaccuracy of identification may not influence choice of controls to be suggested, it obscures the larger problems: the questions of source of each infestation, of routes of dispersal into previously unoccupied islands, and of varietal differentiation under isolation. There is also the great question: What are the basic or natural specific units as opposed to the arbitrary concepts deduced by taxonomists from their fragmentary data?

Species of *Brontispa* and closely similar genera are recorded from the great area of the Indian and Pacific Oceans from Mauritius to the Marshall Islands, while the coconut has attained a pantropic coastal distribution. Since the prehuman home of the coconut is still hypothetical, we can only conjecture if *Brontispa* evolved upon ancestral coconut or if in its dispersal the coconut entered habitats of other palms infested by *Brontispa*, which found the new host better suited to them than their former host plant. The latter is probably true. Human dispersal of both host and pest in the Pacific must have occurred during the thousand years, perhaps much longer, in which canoes were seeking new islands for occupation (Buck, 1938), but this dispersal is now vastly accelerated.

Ancient speciation and recent differentiation of isolated colonies offer tempting themes for speculation and for conflicting concepts of specific or generic status and relationship. Prehuman wind and wave waif-dispersal may have produced isolated species, human transportation may have established divergent colonies, and modern commerce may so mingle the less differentiated island populations as to obliterate their growing peculiarities through interbreeding. If enough samples representing existing infestations could be compared, something might be guessed of this unknown history, but the

[1] Received May 8, 1950.

conclusions would probably vary with the personally held theories of different observers. Definite and trustworthy details and samples under correctly applied names are needed for repeated recomparisons. It seems doubtful if a satisfactory solution could be found even if the *Brontispa* now in all public and private collections were available for study in one place.

Excellent samples from Micronesia supplement a few old samples from the Solomons, Celebes, Java, and a few other islands; but it seems doubtful if taxonomic identifications which will be acceptable to our successors may be possible until far more complete field work provides vastly more evidence. Collectors usually preserve samples under one of two extreme conditions: (1) Most frequently, single specimens that have strayed or fallen from their unobserved ecological niches and which merely arouse curiosity by some obvious peculiarity; or (2) a population that attracts attention by its numbers, or by conspicuous injury to some host easily accessible to the observer. Inaccessibility of the crowns of wild palms prevents search for species still occupying their primordial homes.

Severe damage to young coconuts is chiefly responsible for the interest in and for the samples of *Brontispa*. Samples representing such attacks should be reidentified, but enough are not yet available to permit more than tentative opinions on specific distinctions and varietal affinities. Especially needed are more evidence and samples from the islands of the Papuan and Malayan regions. Specific distinctions and relationships may be regarded very differently by later students with better evidence.

More than a score of specific names are available, but the extensive synonymy indicated by Maulik, 1938, and by Lepesme, 1947, will probably be revised.

Good samples of three species from the former Japanese Mandate—the Marshall, Marianas, and Caroline Islands—prompt this note, one object of which is to correct a misidentification I made some 17 years ago for T. Yoshino, then at the Agricultural Experiment Station in the Palau Islands. One of his samples was of a metallic-blue species without source record but later known to be from Korror, Palau; it seemed to agree exactly with the description of *B. chalybeipennis* (Zacher) from Ponape. The other, from Saipan, was obviously new, but as other samples were independently sent to Europe for description (*B. mariana* Spaeth, 1937, syn. *Planispa castaneipennis* Chujo, 1937), my notes reviewing the accumulated literature and samples were not published. Recent samples from both Ponape and Palau show two distinct metallic-blue species, but since Chujo, 1937, and Lepesme, 1947, cite both of these islands as habitat of *chalybeipennis* my unpublished error appears to have been independently duplicated. Esaki, 1940, mentioned the undescribed blue species from Palau, but no further reference to it has been found except a mention by Lange, 1950. Perhaps this blue species is another form, divergent in structure and color from but associable with the yellow Papuan complex that has been lumped under the name *B. longissima* (Gestro, 1885) by Maulik, 1938, and Lepesme, 1947. Its differences are such, however, that it is now given a distinctive name.

Brontispa yoshinoi, n. sp.

Planispa chalybeipennis (part, not Zacher) Chujo, 1937.
[*Planispa*] n. sp. Esaki, 1940.
Brontispa chalybeipennis (part, not Zacher) Lepesme, 1947.
Brontispa sp. Lange, 1950.

Brown below, black above, the elytral reflections intensely blue; interantennal process of male long and very narrow, not quite passing apex of first antennal joint, that of the female broader at base, tapering and extending beyond middle of first antennal joint, its apex narrowly rounded or truncate and its upper surface deeply sulcate in both sexes, the female showing the sulcus wider and deeper at base; clypeus a little broader than in *froggatti* but with similar dense, erect pubescence over the punctured surface; labrum strongly carinate at middle but without the midbasal tubercle, which is prominent, recurved, and conspicuous in *froggatti;* pronotum broader than in *froggatti*, widest at apparent anterior angles, the real anterior angles visible from above as small obtuse teeth near the sides of the head; the hind angles slightly produced as in

mariana, but not spinose as in *froggatti;* elytral apex brown, subtruncate, with costae extending from apical parts of first, third, seventh and ninth interstices becoming more prominent; the apical emargination between costae one and three narrower; the apices of costae three, seven, and nine more approximate than in *froggatti*.

Length: Male, 7–7.5; female 8.5–9 mm.

Type and 78 paratypes, U.S.N.M. no. 59899.

Type male and 23 paratypes, Korror, May 1932, on coconut, T. Yoshino; 41 paratypes, Peleliu, August 1946, R. G. Oakley; 14 paratypes; Babelthuap, July 1946, R. G. Oakley, all in the Palau Islands (lat. 7° N., long. 135° E.). The source of the first specimens was believed to be Ponape, the type locality of *chalybeipennis*, but this error was later corrected by Mr. Yoshino who, in 1933, wrote the sample was from Korror and that the species was also on Truk, Yap, and Ponape. No specimens from Truk and Yap are accessible, and recent samples from Ponape differ in structure.

This species is closely related to *B. mariana* Spaeth (=*castaneipennis* Chujo) in structure but differs, besides color, in its shorter, narrower interantennal process, narrower clypeus, narrower and more strongly costate elytral apices, and more slender aedeagus. In appearance it resembles *B. chalybeipennis* (Zacher), but in that species the interantennal process, the pronotum, the elytral apices, and the clypeus are different in shape and sculpture.

Brontispa chalybeipennis (Zacher)

Oxycephala (*Xiphispa? chalybeipennis* Zacher, 1913.
Brontispa (?) *chalybeipennis* Zacher, 1915.
Planispa chalybeipennis (Zacher) Chujo, 1937 (part).
Brontispa chalybeipennis (Zacher) Maulik, 1938; Lange, 1950.
Brontispa namorikia Maulik, 1946 (? synonym); Lange, 1950; Maulik 1950.
Brontispa chalybeipennis (Zacher) Lepesme, 1947 (part).

Recognition of this very distinct species has been more difficult because the sexual peculiarities in the frontal process as well as the broad and almost nonpubescent clypeus were not described. Nor were these mentioned by Maulik, 1946, in his description of *namorikia*, which, in spite of recorded differences in proportions of antennae and pronotum, is probably conspecific. The interantennal process of the male reaches the apical third of the stout, first antennal joint and is truncate, slightly longer than wide with a deep fovea within its sharply raised upper margins, the lower margins extending beyond its dorsal width. The rather broad clypeus is slightly convex between the eyes, feebly concave between the antennae and also within the margins of the interantennal process; its surface microgranulate with a few remote setiferous punctures. In the female the interantennal process is narrower and shorter, not reaching the middle of the first antennal joint.

The material before me is excellently preserved and includes nearly 200 specimens from Ponape, Kusaie (300 miles east of Ponape), and 5 atolls of the Marshall Islands which lie some 600 to 800 miles east of Ponape. These atolls are Majuro, Likiep, Jaluit, Ailinglapalap and Kwajalein. Among them lies Namorik, the type locality of the name proposed by Maulik, 1946. Palau is wrongly cited as habitat by Chujo, 1937, and by Lepesme, 1947.

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ENTOMOLOGY.—*The Stratiomyidae (Diptera) of New Caledonia and the New Hebrides with notes on the Solomon Islands forms.*[1] MAURICE T. JAMES, State College of Washington.

In the course of obtaining material for my publication on the Stratiomyidae of the Solomon Islands (James, 1948), I received a considerable number of specimens of flies of this family from the areas both north and south of that archipelago. The present paper deals with the interesting and relatively unknown fauna of the more southern area, comprising New Caledonia and the New Hebrides.

This fauna shows a large element of endemicity, as attested by the fact that 10 of the 19 species appear to be new, and of the remaining 9 only 5 are known to occur outside of the Solomons, New Caledonia, and the New Hebrides. From the standpoint of genera, also, the fauna is peculiar. Two of the genera discussed here are described as new, whereas a third was described in my Solomon Islands paper. One genus (*Eufijia*) apparently enters this region from Fiji, another (*Acanthasargus*) from Australia, and another (*Drosimomyia*) belongs to the African fauna! *Eulalia nitidissima* probably belongs to a genus endemic to the South Pacific. Finally, the development of the Myxosargini in this area is interesting. There are a few widespread generic elements, such as *Eulalia* (*sensu stricto*, as represented by *E. novae-caledoniae*), *Sargus*, *Hermetia* (obviously a recent introduction), and *Microchrysa*, as well as some of narrower, though still wide, distribution, such as *Chrysochroma*, *Nothomyia*, *Wallacea*, *Salduba*, and *Lophoteles*.

I am also taking the opportunity in this paper to make some corrections and additions to my Solomon Islands paper.

The following key will separate those species of Stratiomyidae which are known to occur in the New Hebrides and New Caledonia:

1. Cross vein m-cu present, last posterior vein (Cu_1) consequently arising from second basal cell.....2
   Cross vein m-cu absent, all posterior veins distinctly arising from discal cell.....10
2. Flagellum of antenna elongated, consisting of 6 closely united segments, the last 2 forming a distinct style but never an arista; anal vein (2d A) beyond thickened basal area arcuate but never sinuous (Stratiomyinae, Eulaliini).....3
   Flagellum of antenna shortened and bearing an apical or subapical arista, which is much longer than basal complex of flagellum....4
3. Front, vertex, mesonotum, and scutellum distinctly pilose and pollinose; antenna wholly yellow, scape and pedicel each about as long as broad and style acute; cross vein r-m distinct...*Eulalia novae-caledoniae* Lindner
   Front, vertex, mesonotum, and scutellum over practically entire area shining and completely devoid of pile and pollen; antennal flagellum brownish to black except basally; scape and pedicel each distinctly longer than broad, and style blunt; cross vein r-m absent.....*Eulalia nitidissima*, n. sp.
4. Anal vein distinctly sinuous (Fig. 1, *b*), if feebly so mesonotum is patterned in black and yellow; thorax not metallic green or blue (Stratiomyinae, Myxosargini).....5
   Anal vein straight or arcuate, never sinuous; thorax in large part metallic green or blue (Sarginae).....8
5. Mesonotum black with prominent yellow vittae; abdomen yellow with paired black spots on segments; elongate species with an elongate-ovate abdomen; anal vein distinctly, though feebly, sinuous.
   Hoplistopsis geminatus, n. sp.
   Mesonotum except postalar calli black; abdomen black or rosaceous with black markings; shorter, more robust species with a short-ovate abdomen; anal vein more strongly sinuous.....6
6. Occipital orbits distinct and clearly margined; vein R_4 absent; legs yellow, at most a femoral band and tips of tarsi darkened..7
   Occipital orbits undeveloped or indistinct and not margined; vein R_4 present; at least femora black.....*Nothomyia brevis* (Bigot)
7. Abdomen entirely black.
   Acanthasargus inflatus, n. sp.
   Abdomen with rosaceous markings in the form of broad transverse bands comprising most of terga 2 to 4..*Acanthasargus roseus*, n. sp.
8. Ocellar triangle much longer than broad; eyes separated in both sexes, somewhat more broadly so in female. *Sargus mactans* Walker
   Ocellar triangle approximately equilateral; eyes of male broadly contiguous, of female widely separated.....9
9. Larger species, 8 to 9 mm in length; abdomen in both sexes metallic blue or green; maximum width of anal cell but little greater

[1] Received April 28, 1950.

than that of second basal cell, distinctly less than combined width of two basal cells. *Cephalochrysa chrysidiformis* (Lindner)

Smaller species, about 4 mm in length; abdomen of female metallic blue or green, of male in large part yellow; maximum width of anal cell equal to combined width of two basal cells. *Microchrysa flaviventris* (Wiedemann)

10. Four veins arising from discal cell, that is, media 3-branched; terminal segment of flagellum elongated, either flattened and vanelike or forming a terminal arista, the preceding 2 or 3 segments distinctly furrowed longitudinally on inner surface....11

Three veins arising from discal cell, that is media only 2-branched; terminal segment of antennae forming an arista or aristiform style, the preceding segments not as described above (Pachygastrinae).....13

11. Terminal antennal segment forming an arista (Chrysochlorinae). *Chromatopoda annulipes* (Walker)

Terminal antennal segment vanelike (Hermetiinae).....12

12. Antennal scape 5 times as long as maximum width, longer than style; eyes pilose; abdomen without translucent spots. *Notohermetia pilifrons*, n. sp.

Antennal scape at most 2 or 3 times as long as maximum width, much shorter than style; eyes bare; second abdominal segment with a pair of translucent or pale semitranslucent spots.....*Hermetia illucens* (Linnaeus)

13. Abdomen short, at least as broad as long..14

Abdomen distinctly longer than broad.....16

14. Second antennal segment prolonged fingerlike along inner margin of flagellum; antennae arising from a pair of frontal prominences. *Artemitomima mirabilis* James

Second antennal segment transverse or at most moderately convex apically, not prolonged along inner margin of flagellum; antennae not located on prominences.....15

15. Scutellum on its posterior margin with several pairs of setiferous cornicles, the apical pair being spinelike; basal complex of flagellum much longer than broad, spindle-shaped; vein R_4 normally present; abdomen of male densely silvery-tomentose. *Wallacea dorsalis*, n. sp.

Scutellum without cornicles or spines on its apical margin; basal complex of flagellum not as long as broad; vein R_4 absent. *Drosimomyia baueri*, n. sp.

16. Scutellum with 2 long spines; wing cuneiform, alula not developed; basal complex of flagellum no longer than broad. *Eufijia ovalis*, n. sp.

Scutellum without spines.....17

17. Second antennal segment produced thumblike into flagellum on inner side; basal complex of flagellum much longer than wide; wing cuneiform, without alula; hind femur thickened, with small blunt spines below. *Salduba australis*, n. sp.

Second antennal segment distinctly convex, but not produced thumblike into flagellum on inner side; basal complex of flagellum scarcely longer than wide; wing without distinct alula; hind femur slender without spines below.....18

18. Basal complex of antennal flagellum distinctly blackish to brownish dorsally; second antennal segment with black hairs apically; scutellum in male wholly black-tomentose....*Lophoteles cheesmanae*, n. sp.

Basal complex of antennal flagellum wholly yellow; or at most slightly infuscated dorsally; second antennal segment wholly yellow-haired; scutellum in both sexes with some yellow tomentum. *Lophoteles plumula* Loew

Genus **Eulalia** Meigen

Eulalia Meigen, Nouvelle classification: 21. 1800.

Eulalia novae-caledoniae Lindner

Eulalia novae-caledoniae Lindner, Ann. Mag. Nat. Hist. (10) **20**: 378. 1937.

Lindner described this species from a female taken at Bourail, New Caledonia, May 26, 1928, by T.D.A. Cockerell. The male is quite similar in appearance; the vertical triangle is black, the face orange-yellow with silvery pile, and the legs entirely pale yellow. The mesonotum of the female is golden-tomentose and lacks erect pile except laterally; in the male the golden tomentum is confined to the lateral margin and the entire mesonotum is clothed with erect, yellow pile and with minute appressed black or shiny green scales, the color depending on the light incidence; these scales are also present in the female, but they are sparse and not so evident because of the golden tomentum. The yellow abdominal margin is broader in the male, and it is more nearly exact to describe this sex as having a yellow abdomen with a median black band.

This is a typical *Eulalia* in all respects. The male differs from *E. maculata* (de Meijere) in its yellow face, yellow upper pleura, wholly yellow legs, abdominal pattern, green aspect of the mesonotal scales, and other respects, but it is clearly congeneric with that species as well as with such species as the European *E. hydroleon* (Linnaeus), the American *E. arcuata* (Loew), and the Australian *E. regisgeorgii* (Macquart).

NEW CALEDONIA: Noumea, May 28 and April 6, 1945 (H. E. Milliron), 2 males; Noumea, September 7, 1944 (Wilfred Crabb), 1 male.

NEW HEBRIDES: Santo, August to September 1929 (L. E. Cheesman), B. M. 1929–537, 1 female; Malekula, February 1930 (Cheesman), 1 female; Segond Channel, Espíritu Santo, March 26, and August 16, 1944 (Jean Laffoon), 3 females.

Eulalia nitidissima, n. sp.

Female.—Front across ocellar triangle about one-third (46:126) width of head, widening somewhat to plane of antennal insertion (54:126); frontal callus not distinctly defined posteriorly, the front therefore smooth except for the transverse supraantennal groove and the midfrontal suture; face protuberant, evenly rounded; occipital orbits very narrow. Head extremely glossy and over most of its area entirely bare; a few short white hairs on the cheek; a pair of small spots at each end of the supraantennal groove, a similar spot adjacent to the eye on each side of the face, and most of the occipital orbit, silvery tomentose. Middle of facial prominence and lower angle of oral margin castaneous, head otherwise black. Antennal ratio (same units as head measurements), 13:13:16:10:8:7:2:6; flagellum slender its fourth segment tapering to the two-segmented style, which is subacute apically; scape, flagellum, and extreme base of first flagellar segment yellow; first, second, and third flagellar segments otherwise castaneous, the fourth segment and the style black. Proboscis black, the labella with a few black hairs.

Mesonotum and scutellum polished and completely bare, except for a few brassy hairs along the notopleural suture and immediately above the wing bases; black except the yellow lower part of the humeri and the small castaneous areas immediately around each scutellar spine; scutellar spines very short and weak, yellow. Sides of thorax black except posterior parts of pteropleura, which are yellow; mesopleura, sternopleura, and pteropleura shining, with a few scattered hairs; other pleural areas white-pollinose; some noticeable white hairs and white tomentum anteriorly on each propleuron and noticeable whitish hairs on the metapleuron. Legs mostly yellow; last three tarsomeres of anterior tarsus blackish; tarsi otherwise white. Halteres white, with yellowish knobs. Wings hyaline; strong veins yellow before humeral crossvein and beyond discal cell, otherwise (except the costa, which is more extensively yellow) black; stigma strong, blackish to apex of discal cell, yellow beyond. Vein r-m wanting, the discal cell broadly bordering R_s; veins M_1, M_2, and Cu_1 beyond m-cu merely weak folds; veins Cu_2 and 2d A beyond basal part but little stronger. R_4 wanting.

Abdomen black, without a pattern but with much of tergum I yellow and with suggestions of castaneous medially on tergum II and apically on terga II to V; venter yellow.

Length, 6 mm.

Holotype.—Female, Espíritu Santo, New Hebrides (Gilbert Banner); in the American Museum of Natural History.

Remarks.—The completely bare, highly polished mesonotum and dorsal aspects of the head will distinguish this species from any *Eulalia* known to me. Bezzi describes such a species from Fiji, in *Odontomyia gagathina*, and from his description the two species seem to be closely related. He makes no mention of the absence of cross vein r-m, but neither does he in respect to *O. parallelina*, in which that cross vein is absent. *E. nitidissima* differs from the description of *gagathina* in a number of respects, for example the two pairs of silvery spots on the face and frons, the pollinose pleural areas, the yellow venter, and the yellow femora.

The reference of *nitidissima* to *Eulalia* is provisional. It certainly does not belong to that genus in the strict sense but at present it seems best to refer it there tentatively, until a better classification of the *Eulalia* complex, particularly in this area, can be proposed.

Hoplistopsis, n. gen.

Body slender, front narrow; at its narrowest in the male about as wide as diameter of an ocellus, in the female about width of ocellar triangle. Median line of frons well impressed; frontal callus distinct, entire, white. Occipital orbits undeveloped in the male, developed on the upper half only and narrow in the female. Eyes bare. Antennal scape longer than its maximum width, much broader apically than basally; pedicel broader than long, as broad as flagellum; flagellum about as broad as long, the arista long, bare. Thorax and abdomen, black variegated with yellow, pile and tomentum inconspicuous. Scutellum with two short spines. Abdomen ovate. Legs slender, simple, the basitarsus always longer than the remaining tarsomeres combined. Wing venation as in Fig. 1,*b*; vein 2d A distinctly sinuous.

Generotype, *Hoplistopsis geminatus*, n. sp.

Hoplistopsis geminatus, n. sp.

Fig. 1

Male.—Eyes at narrowest part of front separated by 0.02 head width, head black, except frontal callus, which is ivory; hair very inconspicuous, a few black hairs on the ocellar triangle, some yellowish hairs on the face, and some moderately long yellow hairs on the cheeks. Antennae black with black hairs on scape and pedicel; proboscis pale yellow.

Thorax black, variegated with pale yellow as follows: humeri and broad lateral margins of mesonotum backward to the suture; a pair of discal stripes running from the humeri (and confluent there with the lateral margins) to a point midway from the suture to the scutellar base; scutellum except spines; supraalar calli; and a large pleural area extending from below each humerus across the upper and posterior parts of the mesopleuron, across the upper part of the sternopleuron and hypopleuron and including the entire pteropleuron and most of the metanotal slopes. Scutellar spines brown. Thorax with inconspicuous pale tomentum and a little yellow pile on the propleura and metanotal slopes. Legs, including coxae, mostly yellow; hind tibia, except at base, brownish, with a submedian, slightly swollen annulus yellow; front tarsus except basitarsus and hind tarsus beyond apical fourth of basitarsus becoming blackish. Wings hyaline, veins brown. Halteres yellow.

Abdomen yellow, with a series of paired, sublateral, quadrate black spots, on the terga, one pair to the segment; these are confluent medially on the first segment and tend to become evanescent on the fourth almost disappearing entirely on the fifth. Venter uniformly yellow. Genitalia yellow.

Length, 7 mm.

Female.—Eyes at narrowest part of front separated by 0.09 head width; front gradually, but slightly widening from anterior ocellus to callus. Hind tibia brown only subbasally and apically; middle tarsus sometimes blackish apically. Otherwise, as described for the male.

Holotype.—Male, Hienghene, New Caledonia, December 3, 1944 (Wilfred Crabb), U.S.N.M. no. 59895.

Allotype.—Female, same data.

Paratypes.—1 male, 3 females, same data.

Remarks.—This genus shows relationships to both *Nothomyia* and *Acanthasargus*; it may be distinguished from the latter by the incomplete development of the occipital orbits, from the former by patterning of the thorax and abdomen, and from both these genera by its elongated form, with long narrow wings and a more elongated cell Cu_1, and by the very narrow front of the female. The appearance is more that of a *Rhaphiocera* or *Hoplistes*, but the relatively unmodified venation and the sinuous vein Cu_2 place it in the Myxosargini.

Hardy (1943) has suggested that the Myxosargini "probably . . . are marking some phylogenetical development along which genus *Sargus* may have had its origin." This statement seems reasonable. The sinuous vein Cu_2 appears to be a primitive character in the sargine-stratiomyine stem; some species of the primitive *Cyphomyia* possess it, but this vein becomes straight, usually with an apical angular projection downward, in the Sarginae and the Stratiomyini. The Sarginae

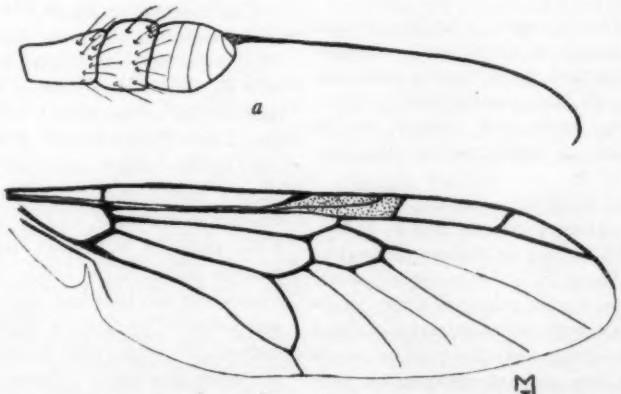

FIG. 1.—*Hoplistopsis geminatus*, n. gen. and sp.: *a*, Antenna; *b*, wing.

move toward the direction of a development of a compact aristate flagellum, an elongated slender body, an unspined scutellum, a dichoptic head in both sexes, and an unpatterned, often metallic, thorax and usually also abdomen, while retaining a relatively primitive wing venation. The Stratiomyinae have a more primitive antennal structure, especially in *Cyphomyia* and its relatives; scutellar spines tend to disappear only in some of the more specialized members of the group; there is a strong tendency toward patterning of the thorax, abdomen, and even the head, and toward a reduced wing venation; the holoptic head prevails in the male sex; the body is usually relatively short and robust. The Analcocerinae, which probably arise from the common stem of the sargine-stratiomyine group, tend toward a patterned thorax and abdomen and a *Sargus*-like body; the wing venation is relatively primitive but tends toward bizarre developments as do the scutellar, leg, and general body modification. The Myxosargini have probably arisen from near the base of the common stem and have retained the primitive venation, including the sinuous 2d A (but frequently with the loss of R_4 and, rarely, of M_3), but have tended toward the aristate antenna in the more highly evolved forms. The patterning of the thorax and abdomen and the aristate antenna combine with some more primitive characters to define the genus *Hoplistopsis*.

Genus **Nothomyia** Loew

Nothomyia Loew, Berliner Ent. Zeitschr. **13:** 4. 1869.

Nothomyia brevis (Bigot), n. comb.

?*Rhaphiocer brevis* Bigot, Ann. Soc. Ent. France (6) **7:** 26. 1887.

Male.—Head black, mostly subshining; frontal triangle with a pair of small oval yellowish-white spots separated by a shining area, pile of the face blackish, that of genae mostly silvery. Antennae black; arista well defined, slender throughout; ratio of scape, pedicel, flagellum and arista 7:5:7:36.

Thorax black, subshining; scutellum on apical half and spines, except extreme apices, yellow; spines about 0.6 as long as distance separating them at their bases. Pile of mesonotum mostly and of scutellum wholly yellowish-white; mesonotum in addition with yellow tomentum. Pleura and sterna subshining and silvery-pilose except a bare shining area on each mesopleuron from the anterior coxa to the notopleural suture. Legs with median third of middle and hind tibiae, middle and hind basitarsi, and second segment of middle and basal part of second segment of hind tarsi, pale yellow; otherwise black. Pile of legs mostly pale. Wings hyaline; veins brownish except near base of wing where they are yellowish; stigma well marked, brown; vein R_4 present. Halteres yellow, knobs almost whitish.

Abdomen black, with reddish or purplish reflections in certain lights; terga with long silvery hairs laterally and on segment five, otherwise with inconspicious short black pile; sterna with appressed silvery hairs. Genitalia yellowish; dististyle robust, black, subconical, somewhat curved inward apically.

Length, 4.5 mm.

Female.—Front about 0.15 head width at vertex, about 0.3 head width at plane of antennal insertion; gradually widening from above downward, but more abruptly so below the frontal callus; middle fourth of front shining, the broad occular orbits subshining; frontal callus with two yellowish spots as in male but more widely separated. Pile of face silvery. Scutellum black at base, otherwise yellow. Middle and hind tibiae somewhat more extensively yellow than in the male; first three segments of middle and hind tarsi yellow. Pile of thorax and abdomen shorter and less conspicuous. Otherwise, except sexually, as described for the male.

Redescribed from the following material: NEW CALEDONIA: Noumea, October 30, 1944 (Wilfred Crabb), 2 males, 1 female; Hienghene, December 3, 1944 (Crabb), 2 males; Corela, March 11, 1945 (David G. Hall), 1 male, 1 female; Bourail, December 1930 (L. E. Cheesman), B. M. 1931–123, 1 male.

I am indebted to James E. Collin for information concerning the wing venation of Bigot's type, particularly in respect to the presence of vein R_4 and the sinuousity of the 2d A. On the basis of this information, I feel virtually certain that I have Bigot's species. The original description agrees wholly with my material except Bigot's statement that the front tarsi are castaneous at the base, and in my material some color variation is evident, particularly in the Bourail specimen, in which the apices of the femora and the base and apex of the front tibia are yellow. This species traces in my key to *Nothomyia* (James, 1942, p. 53) to couplet 7, but the arista is strongly differentiated and vein R_4 present.

Genus **Acantharsargus** White

Acantharsargus White, Pap. Roy. Soc. Tasmania 1914-15: 60. 1914.

Members of this genus differ from the closely related *Nothomyia* in that they have the occipital orbits distinct and sharply margined behind, in both sexes. There is a tendency toward variegation in the color of both the thorax and the abdomen. The following key, modified from Hardy (1932, p. 48), will serve to separate the known species.

1. Thorax and abdomen entirely black.....2
   Thorax at least yellow or rosaceous in part..3
2. Scutellum and scutellar spines black.
   pallustris White
   Scutellum with a yellow bar between yellow scutellar spines.....*gracilis* White
3. Abdomen entirely black.....*inflatus*, n. sp.
   Abdomen margined and spotted or banded with yellow or rosaceous.....4
4. Abdominal markings rosaceous, in the form of broad transverse bands comprising most of terga 2 to 4.....*roseus*, n. sp.
   Abdominal markings yellow, limited to lateral margins and discal spots.....5
5. Scutellum and spines entirely yellow; legs almost entirely yellow.....*flavipes* Hardy
   Scutellum black, scutellar spines yellow; legs yellow, with sections of the femora and tibiae black.....*varipes* Hardy

Acanthasargus inflatus, n. sp.

Female.—Occipital orbits yellow on upper half, head otherwise black. Width of front at vertex 0.21, at upper margin of frontal callus 0.30, at level of antennal insertion 0.40, head width; front subshining above callus, with appressed blackish hairs. Occipital orbits shining, inflated below the yellow area and there ultimately becoming subshining as a result of the setiferous punctures; pile of face and genae yellow. Antennae black; arista sharply differentiated. Proboscis yellow.

Thorax mostly black; scutellum including spines, most of humerus and the margin of mesopleuron along notopleural suture to wing base, a spot posteriorly on each pteropleuron, and supraalar calli, yellow; mesonotum with yellow tomentum; pleura white pilose. Wings hyaline; veins brownish yellow; vein R_4 missing. Halteres yellow. Coxae black, legs otherwise yellow, the tarsi becoming blackish apically; hind tarsi missing in type.

Abdomen black; some whitish pile laterally especially on basal segments; terga with inconspicous appressed black hairs; sterna with appressed yellowish hairs.

Length, 3.5 mm.

Holotype.—Female, Noumea, New Caledonia, October 30, 1944 (Wilfred Crabb), U.S.N.M. no. 59896.

Remarks.—It is possible that this is the female of *A. roseus;* however, the difference in antennal structure (the arista in this species being distinctly differentiated) whereas in *roseus* it grades somewhat into the basal flagellar complex), together with the difference in coloration, makes such a reference doubtful.

Acanthosargus roseus, n. sp.

Male.—Head mostly black and shining to subshining; the occipital orbits narrowed and pinkish yellow or rosaceous above, black and expanded below; all pile yellow. Antenna black; flagellum with basal three segments distinct, the fourth almost as wide basally as the apex of the third, and gradually narrowing through the fifth to the aristiform sixth. Proboscis yellow.

Thorax mainly black; humerus, notopleural margin of mesopleuron from humerus to wing base, a spot on the pteropleuron adjacent to wing base, and a large spot on the upper part of the sternopleuron, connected or nearly so with a similar spot on the upper margin of the hypopleuron, rosaceous; posterior margin of pteropleuron, postalar calli, and broad sides and apex of scutellum, including spines, yellow, sometimes tending to rosaceous. Scutellar spines about 0.4 as long as their basal separation. All pile white, that on mesonotum appressed. Halteres yellow, the knobs white. Wings hyaline, veins brownish yellow. Vein R_4 missing. Coxae and apical two tarsomeres blackish, legs otherwise yellow.

Broad sides of first tergum, second tergum except narrow apex, and third and fourth except narrow bases and apices, rosaceous; genitalia yellow; abdomen otherwise black. Some long erect white pile laterally on dorsum; pile otherwise appressed, whitish on venter, on genitalia and on rosaceous areas, otherwise mostly black. Dististyli short, robust, subconical, incurved.

Length, 4 mm.

Holotype.—Male, St. Louis Valley, New Caledonia, March 24, 1945 (H. E. Milliron); University of Minnesota collection.

Paratopotypes.—14 males, same data.

Remarks.—Some color variation occurs. Certain specimens have an indefinite pair of rosaceous to yellow spots on the front, and the color of the pale areas of the scutellum and postalar calli may vary from yellowish to rosaceous. The hypo-

pleural spot and the legs, however, are in all specimens distinctly yellow and in contrast even to the variable scutellum.

Genus **Sargus** Fabricius

Sargus mactans Walker

Sargus mactans Walker, Proc. Linn. Soc. London **4**: 97. 1860.

The material examined differs from that of the Solomon Islands and northward in having the metapleura white or clear yellow and the rest of the pleural sclerites more extensively whitish or yellow than in the more northern forms. This form should, perhaps, be considered a geographical subspecies, but I feel that, because of the difficulties involved in this complex and the lack of sufficient material, to describe it as such would be premature.

S. mactans has been recorded from the Solomon Islands northward to India and the Philippine Islands. Neither it, nor any other true *Sargus*, is known from Fiji. NEW CALEDONIA: St. Loius Valley, March 22, 1945 (H. E. Milliron), 1 male, 1 female; Noumea, April 1, 1945 (H. E. Milliron), 1 female.

Genus **Cephalochrysa** Kertész

Cephalochrysa chrysidiformis (Lindner)

Microchrysa chrysidiformis Lindner, Ann. Mag. Nat. Hist. (10) **20**: 373. 1937.

NEW HEBRIDES: Espíritu Santo Island, August 1943 (W. Bauer), 1 female; Segond Channel, Espíritu Santo Island, May 30, 1944 (J. Laffoon), 1 female.

Genus **Microchrysa** Loew

Microchrysa flaviventris (Wiedemann)

Sargus flaviventris Wiedemann, Analecta Ent.: 31. 1824.

In my account of the Stratiomyidae of the Solomon Islands (James, 1948, p. 199), I misdetermined this species, and records included in that paper should refer instead to *M. fuscistigma* de Meijere, a species originally described from New Guinea. *M. flaviventris* occurs farther northward, the common form in India and the Philippine Islands appaerntly being that species; its occurrence south of the Solomon Islands is, therefore, surprising.

NEW HEBRIDES: Espíritu Santo Island, September 1944 (K. L. Knight), 1 male.

The following key will serve to separate the sexually dichromatous species of *Microchrysa* known to occur in the Palearctic and Oriental Regions.

1. Vein M_{1+2} between its contact with cross vein r-m and its furcation (*ie.*, upper apical border of discal cell) almost evanescent; abdomen of male yellow, with a prominent black spot on tergum V, that of female metallic green or blue; hind femur and hind tibia each with a black annulus, sometimes the femur extensively black.....*flaviventris* (Wiedemann)
   Vein M_{1+2} between its contact with r-m and its furcation strong.....2
2. Stigma often infuscated, at least yellowish; abdomen elongated, scarcely broader than thorax.....*fuscistigma* de Meijere
   Stigma scarcely darker than rest of membrane; abdomen broader than thorax.
   laodunensis Pleske

Genus **Chromatopoda** Brauer

Chromatopoda annulipes (Walker)

Sargus annulipes Walker, List of the specimens of dipterous insects in the collection of the British Museum, pt. 3: 515. 1849.

NEW HEBRIDES: Ounua, Malekula, February 1929 (L. E. Cheesman), B.M. 1929-234, 3 males; N. E. Malekula, May 1930 (Cheesman), B. M. 1930-178, 1 male; Espíritu Santo, April and August 1943 (W. Bauer), 1 female, 2 males; Turtle Bay, Espíritu Santo, February 11 and 17, April 2, May 18, 19, 23, and 24, 1944, and November 7, 1943 (J. Laffoon), 4 males, 4 females; Segond Channel, January 24, February 8, and April 9, 1944 (Laffoon), and August 1944 (L. E. Rozeboom), 3 males, 2 females.

Notohermetia, new genus

Close to *Hermetia* and differing from that genus chiefly in the antennal structure, particularly in the elongated scape, which is five times as long as its maximum width. Antenna longer than head, about two-thirds head width; flagellum grooved inwardly as in other Hermetiinae; terminal segment about half as long as preceding flagellar segments combined, vane-like as in *H. illucens* but more distinctly pilose and proportionately much shorter. Eyes densely and distinctly pilose. Scutellum unspined. Body slender; abdomen much longer than thorax and three times as long as wide, parallel-sided. Venation essentially as in *Hermetia*. The general habitus is that of a slender *Hermetia*.

Generotype, *N. pilifrons*, n. sp.

Notohermetia pilifrons, n. sp.

Male.—Head broad, concave posteriorly; length in micrometers units (60 = 1 mm) 50, width 134; bluish green, subshining to shining, fairly thickly clothed with black hair which is of moderate length on the face but becomes longer on the front and vertex, that behind the ocelli being definitely the longest found on the entire insect. Vertex 0.3 head width, front widening to 0.37 at plane of antennal insertion. Antennal measurements in micrometer units: scape, 26; pedicel, 8; flagellum excluding style, 35; style (last flagellar segment), 20.

Thorax mostly bluish green; a calluslike area on posterior margin of mesopleuron, whitish; some poorly defined areas on pteropleura and hypopleura reddish; pile mostly pale, inconspicuous, only that of the metapleura prominent. Legs largely black, the knees, the basal third of the middle and basal two-fifths of the hind tibiae, the middle basitarsus and second tarsomere, and the basal half of the hind basitarsus whitish. Halteres white. Wings rather deeply infuscated except basally; veins brown.

Abdomen long, slender, almost parallel-sided, slightly constricted on the first segment and slightly widening on the fourth and basal part of the fifth; bluish green on the first tergum, becoming reddish on the second and third, reddish brown on the fourth and fifth; sterna somewhat paler, almost yellow toward apex. Genitalia yellow.

Length, 7 mm.

Holotype.—Male, Santo, New Hebrides, August–September, 1929 (L. E. Cheesman), B. M. 1929-537; in the British Museum (Natural History).

Genus **Hermetia** Latreille

Hermetia illucens (Linnaeus)

Musca illucens Linnaeus, Systema naturae, ed. 10, **1**: 589. 1758.

NEW CALEDONIA: Noumea, September 1, November 7, 1944 (Wilfred Crabb), 1 male, 1 female; La Fea, May 28, 1945 (H. E. Milliron), 1 male; St. Louis Valley, March 24, 1945 (H. E. Milliron), 1 male.

Genus **Artemitomima** James

Artemitomima James, Proc. U. S. Nat. Mus. **98**: 205. 1948.

Artemitomima mirabilis James

Artemitomima mirabilis James, Proc. U. S. Nat. Mus. **98**: 206. 1948.

This species was described from a single female, from Guadalcanal Island. The male described below is certainly congeneric and apparently conspecific, as all variations from the female are of such a nature as can be explained on the basis of sexual dimorphism. The fact that the male specimen is slightly teneral may account for some of the color variations.

Male.—Vertex 0.15 head width, narrowing gradually on the front to about 0.075 head width at half the distance from the anterior ocellus to the antennal insertion, thence widening to the facial width which is approximately as in the female. Frontal carinae present though feeble, evanescent on lower half of front; area between carinae yellowish (not fully colored?). Trochanters yellow, femora yellow except apex of front, apical third of middle, and apical fourth of hind pair; tibiae yellow, blackish on basal third to half and at apex; first two segments of middle and first and basal half of second segment of hind tarsi yellow; legs otherwise black. Wing with brownish spot at apex of discal cell; the narrow band, extending from apical part of basal cells across veins Cu_2 and Cu_2 + 2d A, interrupted in second basal cell and not as prominent as in the female; wings otherwise hyaline. Tomentum of abdomen silvery. Hypopygium slender, shining black; forceps slender, rounded apically, yellow.

Length 7.5 mm.

Described from a male, Malekula, New Hebrides, February 1930 (L. E. Cheesman), B. M. 1930-178; in the British Museum (Natural History).

Genus **Wallacea** Doleschall

Wallacea Doleschall, Nat. Tijdschr. Ned. Ind. **17**: 82. 1858.

The genus *Wallacea* is represented in the South Pacific and in Australia by a group of closely related species which have the following characters in common: Eyes separated, distinctly pilose in both sexes, more widely separated in the female but more distinctly pilose in the male; scutellum with a row of setiferous dentulae which become more prominent toward the apex, the apical pair appearing as small spines, about one-fourth as long as the scutellum, and much more

prominent than the similarly located dentulae in the more northern species; male abdomen with the second and third terga densely silvery-tomentose, the tomentum completely concealing the ground color and appearing glossy under reflected light. The following key will separate the known species of this group.

1. Scutellum with the pale tomentum either not reaching the apex even along the median line (male) or interrupted subapically (female); eyes brownish- to black-haired; mesonotum anteriorly with 2 prominent vittae where the scattered white tomentum is lacking; front of male about 0.13 to 0.14 head width; fifth abdominal segment of male devoid of white hairs or tomentum.....2

Scutellum with white or yellow tomentum reaching apex medially; eyes white-haired; mesonotum with at most only narrow obscure vittae anteriorly; front of male about 0.17 to 0.18 head width; fifth abdominal segment of male with a patch of white tomentum on each side (*splendens* Hardy).

argentea Doleschall

2. Mesonotal tomentum of female brassy, at least posteriorly; black mesonotal vittae confluent with black lateral postsutural areas, in both sexes, or mesonotum predominately black-tomentose.....*dorsalis*, n. sp.

Mesonotal tomentum of female at most slightly yellowish; mesonotal vittae reduced, not confluent with lateral areas, in male not reaching more than halfway to suture.

connectens, n. sp.

Wallacea dorsalis, n. sp.

Male.—Head black. Front about 0.14 head width, nearly parallel-sided, a little narrower at middle, as broad or slightly broader than ocellar triangle; granular above, polished in middle below; face black, broadening toward lower eye margins where it is about 1.7 width at antennal insertions; facial margins and lower frontal margins conspicuously silvery-pruinose; hairs of front and face black. Eyes with distinct though somewhat scattered gray pile. Antennae reddish, darkening to brown toward end of flagellum; style shining black on basal segment and basal part of terminal segment, the latter becoming brown medially and white to whitish on its apical half or more.

Thorax including scutellum black, with erect black hairs which are mostly longer than the apical scutellar spines; a patch of silvery scale-like tomentum just above, and a similar patch just below, the notopleural suture; similar though usually smaller patch just above each wing base; tomentum of mesonotum and scutellum otherwise black and consequently inconspicuous, except for a few scattered scales, particularly in front of and at the base of the scutellum. Sternum with appressed whitish hairs.

Apices of femora yellow; middle and hind tarsi yellow, becoming brownish and then blackish on the apical segments; legs otherwise black, black-haired except the coxae, which are whitish-haired. Wings hyaline, veins brownish yellow. Halteres blackish, the knobs brownish. Abdomen black; second and third terga with dense silvery tomentum which entirely conceals ground color and which gleams brightly under reflected light; first, fourth, and fifth terga and all sterna with short black recumbent hairs, the fourth tergum in addition with a few scattered silvery scales. Genitalia yellow.

Length, 3.5 mm.

Female.—Front 0.25 head width; face broadening toward lower eye margins to about 1.4 width of front at vertex or 1.25 at antennal insertions. Front on upper part with some scattered yellowish tomentose hairs. Hairs of face mostly pale, apical segment of antennal style almost wholly white. Thorax mostly with white (lateral) and yellow (dorsal) tomentum; a pair of vittae running from anterior margin of mesonotum to prescutellar depression, either continuous or interrupted at the suture, a rounded lateral area on each side in front of the suture, most of the mesonotal prominence behind the suture, and the apical half of the scutellum, all entirely black-tomentose. Abdomen black; no dense tomentum as described for the male, but with lateral patches on the terga, particularly noticeable on segments three, four, and five, and scattered silvery scales on segments four and five and on the apex of three. Otherwise as described in the male.

Holotype male, *allotype* female, and *paratypes* (3 males and 1 female).—Espíritu Santo Island, New Hebrides, August 1943 (W. Bauer). Holotype in the California Academy of Sciences.

Variation.—Four males, same data as the types, agree in every way except that the mesonotum has a pattern of silvery tomentum similar to that of the female, though more restricted, particularly anteriorly. The erect pile is black and conspicuous, as in the male types. These specimens probably represent a Mendelian variant. At the other extreme a male from Segond Channel, Espíritu Santo Island, August 1, 1944 (J. Laffoon), completely lacks the mesonotal pale

tomentum and has the pleural patch restricted to a small area just before the termination of the transverse mesonotal suture.

Wallacea connectens, n. sp.

Wallacea argentea Doleschall, James, Proc. U. S. Nat. Mus. **98**: 208. 1948; not Doleschall, Nat. Tidjschr. Ned. Ind. **17**: 82. 1858.

A comparison of the Solomon Islands form with that occurring farther northward and in Australia reveals distinctions which appear to be quite clearly of specific value. The major points of difference are given in the key; in addition to these, the erect pile of the mesonotum, in the male, is definitely longer than the width of the front, whereas in *argentea* it is shorter. The relationship between *connectens* and *dorsalis* is obviously closer than that between these species and *argentea;* in fact, *connectens* and *dorsalis* may eventually be considered geographical subspecies.

Holotype.—Male, Guadalcanal Island, Solomon Islands, 1944 (C. O. Berg); U.S.N.M. no. 59897.

Allotype.—Female, Guadalcanal Island, 1944–1945 (Berg).

Paratypes.—12 males, 22 females Guadalcanal, 1944, January 1944, and 1944–1945 (Berg); 1 male, 1 female, Lunga River Valley, Guadalcanal Island, October 3, 1944 (J. Laffoon); 2 females, Metanikau River Mouth, Guadalcanal Island, May 21, 1944 (H. E. Milliron); 1 female, Munda Point, New Georgia, 1943 (W. G. Downs); 2 males, Bougainville Island, 1944 and April 10, 1944 (Downs); 2 males, 2 females, Tenaru River, Guadalcanal Island, January 1945 (G. E. Bohart).

Genus **Drosimomyia** Kertész

Drosimomyia Kertész, Ann. Mus. Nat. Hungarici **14**: 160. 1916.

The genus *Drosimomyia* is known from three previously described species, all Ethiopian. A fourth, from New Hebrides, seems to be congeneric, though differing from the genotype, *D. natalensis* Kertész, and from *oldroydi* James and presumably *mercurialis* Lindner, which I know only from the description, in the configuration of the front and face.

KEY TO THE KNOWN SPECIES OF *DROSIMOMYIA*

1. Antennal flagellum dark brown and contrasting distinctly with yellow scape and pedicel; vein R_4 present, though weak. *mercurialis* Lindner

   Antennal flagellum at most somewhat darkened outwardly; vein R_4 absent.....2

2. Frons narrowest at antennal insertion, widening toward vertex, face also widening toward lower corner of eyes; rather slender species. *baueri*, n. sp.

   Frons and face nearly parallel-sided, the frons slightly wider at antennal insertion than at vertex; more robust species.....3

3. Proboscis wholly black; mesonotal tomentum brassy in male, silvery in female. *natalensis* Kertész

   Haustellum largely yellow; mesonotal tomentum golden in male, pale yellow in female. *oldroydi* James

Drosimomyia baueri, n. sp.

Female.—A slender species, wholly black in ground color except for the appendages and ovipositor. Elevation of ocellar triangle above front prominent. Vertex about 0.37 head width, front at antennal insertion 0.25, face at lower angle of eye 0.30; fronto-facies consequently appearing rather narrow and constricted at plane of antennal insertion. Front shining, with a few inconspicuous scattered black hairs especially on the ocellar triangle; face densely silvery-pruinose on the orbits, shining with a few scattered, inconspicuous pale hairs medially. Occiput shining, with a few black hairs on the orbit above and a few yellowish ones below. Proboscis yellow, yellow-pilose. Antennae yellow, the basal two segments somewhat paler, the arista pale brown; all pile and pubescence yellow.

Mesonotum and scutellum brassy-tomentose; a pair of median vittae before the suture and the postsutural prominences black-tomentose. Pleura with the posterior half of the mesopleura and upper margin of the sternopleura silvery-tomentose; some silvery hairs on the sternopleura below; pleura otherwise shining. Legs pale yellow, wings hyaline, the stronger veins brownish to brownish yellow; vein R_4 absent.

Abdomen whitish-pruinose on segment 1, dorsally and ventrally; terga 2 and 3, except broad sides, and tergum 4 except broad sides and apex densely punctured and with black tomentum; terga otherwise, and sterna 2–5 shining; pile of tergum 5 and of sides and apex of tergum 4 yellow. Ovipositor mostly yellow.

Length, 2.5 mm.

Holotype.—Female, Espíritu Santo Island, New Hebrides, August 1943 (W. Bauer), in the California Academy of Sciences.

Paratypes.—4 females, same data.

Genus **Eufijia** Bezzi

Eufijia Bezzi, Dipt. Fiji: 10. 1928.

Eufijia ovalis, n. sp.

Female.—Head black, shining; rather bare, with a few hairs, yellow on the front, blackish on the upper occiput, and whitish and most abundant on the face and cheeks. Antenna bright yellow on basal two segments and flagellum, shining black on first segment of style, black on the extreme base of the terminal segment of the style, which is otherwise white with dense, soft, white pubescence. Proboscis pale yellow with concolorous hairs. Head measurements of holotype in micrometer units (60 = 1 mm): head height 31, width 45; width of front at antennal insertion 8, at anterior ocellus 16, across paired ocelli 18; first antennal segment 2.5, second 5, flagellum excluding style 9, basal segment of style 1, terminal segment of style 34.

Thorax, including scutellar spines, wholly black. Mesonotum with rather thick golden tomentum which becomes paler laterally; disc of scutellum with similar tomentum, the spines, however, bare except basally; pleura white-tomentose, the pteropleura anteriorly and the lower parts, however, largely bare and shining.

Legs pale yellow, almost whitish, the apical third to half of each femur and a similar basal part of each tibia distinctly yellow and contrasting with the paler portion. Wings somewhat clouded, with brownish veins; R_4 oblique, about 1.5 its length from apex of R_5. Halteres yellow with infumated knobs.

Abdomen black; dorsally with a granular appearance, particularly anteriorly, and with appressed whitish to yellowish hairs; ventrally much smoother and more shining, with scattered whitish hairs, except on fifth sternum which is more granular and whitish-tomentose. Ovipositor slender, pale yellow.

Length, 3.5 mm.

Holotype.—Female Espíritu Santo Island, New Hebrides, August 1943 (W. Bauer); in the California Academy of Sciences.

Paratypes.—Female, Segond Channel, Espíritu Santo Island, July 20, 1944 (Bauer); 2 females, Malekula, New Hebrides, January 1930, B. M. 1930-178, and April 1930, B. M. 1930-393 (L. E. Cheesman). A headless specimen from Segond Channel, May 3, 1944 (J. Laffoon), is obviously this species but is not being given a type designation.

Remarks.—Five species of this genus are previously known, all described by Bezzi from Fiji (Bezzi, 1928, pp. 10–15). In Bezzi's key, *E. ovalis* traces to *E. albicornis* Bezzi except that the head is distinctly broader than high, the arista in the female (male unknown) is white except at the extreme base, where it is black, and the legs are white, the apical third of each femur and basal third of each tibia being yellow and contrasting distinctly in well preserved specimens. Vein R_4, though distant by about $1\frac{1}{2}$ times its length from the apex of R_5 is distinctly oblique.

Genus **Salduba** Walker

Salduba Walker, Proc. Linn. Soc. London **3**: 79. 1859.

Salduba australis, n. sp.

Female.—Head black. Front parallel-sided, slightly more than one-fifth of head; a slight carina extending from anterior ocellus to a point about two-thirds to base of antennae, where it divides into two converging low, rounded ridges, upon the extremities of which the antennae arise; face broadening toward oral margin; middle of face smooth, shining, depressed below level of sides; sides of face, except orbits, granular. Occiput, viewed from above, rather strongly concave; shining. Frons practically bare; face on punctate portion with scattered whitish hairs; facial orbits, lower part of frontal orbits, and lower half of occipital orbits densely whitish-pruinescent; pile of lower posterior orbits white, that of occiput otherwise blackish. Antenna yellow, becoming reddish on flagellum; style with its pile black; ratio of scape, pedicel, flagellum, and style 8:6:16:33 (these being measurements of maximum lengths, and allowing for some overlapping as a result of the angularity of the pedicel and base of the flagellum); antenna about 1.2 maximum head width. Proboscis yellow, labella mostly brownish.

Thorax black, at most the humeri a little reddish; mesonotum granular, densely tomentose, tomentum largely golden but interrupted by three broad longitudinal black stripes, one median and one on each side removed by a golden-tomentose area from the notopleural suture; tomentum of pleura golden above, gradually merging into whitish below; a large bare shining area on each mesopleuron and pteropluron. Coxae yellow. Femora yellow, paler at base; tibiae brownish to black, each with a median area ranging from a

narrow, indistinct annulus to about one third the member, yellow; the dark area of the front and middle tibia usually brown, that of the hind tibia blackish to black; tarsi whitish on first two segments, becoming brownish apically. Halteres yellow, knobs somewhat darker. Wings almost uniformly brownish, stigma and veins dark brown.

Abdomen except genitalia black, tending toward brownish or yellowish on the sterna, especially toward apex of abdomen, in some specimens; first four terga densely black pollinose except laterally on all segments and subbasally and subapically on the fourth; pollinose areas with short black tomentum; sides and venter sparsely punctured, with scattered whitish to yellowish hairs. Genitalia yellow.

Length, 6–6.5 mm.

Male.—Eyes broadly contiguous. Frontal triangle silvery-pollinose on orbits; median area depressed. Flagellum shorter in proportion, antennal ratio being 8:6:15:34. Black mesonotal stripes, especially median one, not so clearly defined as in female. Pile of pleura more extensively whitish. Coloration of legs similar to that of female, but yellowish areas more extensive, the middle tibia being almost entirely yellow. Wings but lightly infuscated. The specimen may be slightly teneral.

Holotype.—Female, Espíritu Santo Island, New Hebrides, August 1943 (W. Bauer), in the California Academy of Sciences.

Allotype.—Male, Malekula, New Hebrides, February 1930 (L. E. Cheesman), B. M. 1930-178.

Paratypes.—3 females, same data as holotype.

Remarks.—This form is probably only subspecifically distinct from the one from the Solomon Islands that I have tentatively identified (James, 1948, p. 212) as *S. lugubris* (Walker). The coloration of the legs and of the mesonotal tomentum in the male of the Solomon Islands form is as I have described them for the female of *australis*; the female of the Solomon Islands form has whitish rather then golden mesonotal tomentum, and the legs are darker, the femora being predominantly black or blackish. It is probable that the Solomon Islands forms *australis*, *lugubris*, and *diphysoides* Walker are all subspecies of one species, *diphysoides* holding priority. A more thorough investigation requiring considerable material from New Guinea, the Moluccas, and nearby areas will be necessary to clarify the status of these forms.

Genus **Lophoteles** Loew

Lophoteles Loew, Berlin. Ent. Zeitschr. 2: 110. 1858.

Lophoteles cheesmanae, n. sp.

Male.—Eyes broadly contiguous. Head black; frontal triangle and face with dense silvery tomentum; occiput and vertex shining, with scattered black hairs. First and second antennal segments pale yellow, each with a few black hairs at apex above; flagellum pale yellow, brownish above; style including hairs wholly black. Proboscis brownish with concolorous hairs.

Thorax wholly black, at most brownish-black on the humeri and on parts of the pleura. Mesonotum granular with brassy-yellow tomentum laterally also with blackish tomentum, which appears from the dorsal view as black-tomentose margins, the yellow tomentum in these areas appearing from lateral view; scutellum black-haired; a prominent white-tomentose area on the hind part of the mesopleuron and extending on to the sternum and a patch of brownish-yellow hairs on the pteropleuron. Legs pale yellow; apical third to half of each femur and sometimes apices of tarsi more brightly yellow. Wings slightly infumated; stigma deep brown; a more diffused brownish area extending from stigma across discal cell and broadly bordering vein Cu toward wing base; venation typical. Halteres blackish, the stalk somewhat paler.

Abdomen wholly black; first four terga, except laterally, granular; sides of these terga, all of fifth and venter more shining; hair of terga black, appressed, that of venter black and yellowish intermixed. Genitalia black, with yellow hairs.

Length, 4 mm.

Female.—Front at narrowest slightly under one-fourth head width, shining, with only very scattered hairs. Silvery-tomentose areas of face extending in the form of two projections, contiguous with each eye, onto lower third of front; these projections each rounded above and widely separated, leaving the median half of the front, between them, glossy. Occipital orbits developed above, though narrow. Brassy tomentum of mesonotum extending over most of scutellum. Ovipositor slender, yellow. Otherwise as described in the male.

Holotype.—Male, Aneityum, New Hebrides, October 1930 (L. E. Cheesman), B. M. 1931-127, in the British Museum (Natural History).

Allotype.—Female, Malekula, New Hebrides, January 1930 (L. E. Cheesman), B. M. 1930-178.

Paratypes.—2 males, same data as holotype; female, same data as allotype; female, Malekula, Ounua, March and April 1929 (L. E. Cheesman), B. M. 1929-343.

Variation.—The female paratype, B. M. 1930-178, has a blackish spot ventrally near the apex of each femur.

Lophoteles plumula Loew

Lophoteles plumula Loew, Berlin. Ent. Zeitschr. **2**: 111. 1858.
Lophoteles plumula Loew, Kertész, Ann. Mus. Nat. Hungarici **12**: 513. 1914.

Two males, Segond Channel, Espíritu Santo, New Hebrides, July 19 and August 10, 1944 (J. Laffoon), are tentatively referred to this species. They agree with Kertész's description except that the appressed hairs of the abdominal terga are black; the lateral erect hairs, as well as those of the venter, are, however, pale. These specimens are more slender than the males of the preceding species; the antenna except the style is wholly yellow, with yellow hairs on the first two segments; the pale tomentum of the mesonotum extends onto the scutellum; and the halteres are but slightly infuscated.

Genus **Evaza** Walker

Evaza Walker, Proc. Linn. Soc. London **1**: 109. 1857.

Evaza fulviventris Bigot

Evaza fulviventris Bigot, Ann. Soc. Ent. France (5) **9**: 220. 1879.

This species may be added to the Solomon Islands list on the basis of a male, Bougainville Island, 1944 (A. B. Gurney), which apparently belongs here. The scutellum has only one pair of spines, the middle pair being missing and without trace of scars, but this seems to be an abnormality. The side spines are in the normal position. Otherwise, the specimen checks with specimens from New Guinea and with Bigot's description. In my key to the Solomon Islands Stratiomyidae (James, 1948, pp. 187–191) this species runs to couplet 29, but may be distinguished from other Solomon Islands *Evaza* by the wholly black thoracic tomentum, the reddish-yellow legs (except the hind tibiae largely blackish), and the partially (female) to almost wholly (male) reddish-yellow abdomen.

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ENTOMOLOGY.—*New species of Nearctic* Rhyacophila (*Trichoptera, Rhyacophilidae*).[1] HERBERT H. ROSS, Illinois State Natural History Survey. (Communicated by C. W. Sabrosky.)

The four new species of Trichoptera described in this paper are from the western montane region. One of them, *Rhyacophila willametta*, is an addition to the remarkably large list of species in the genus that seem to be isolated survivors of divergent and distinctive phyletic lines.

The close structural similarity and the known distribution of *R. tucula* and *R. alberta* suggest very strongly that they were formed from isolated populations during the last glacial advance. *R. alberta* is known only from the Uintah and Rocky Mountain ranges, distributed from Utah and central Colorado to middle Alberta. *R. tucula* occurs in the Cascade Range from Oregon to southern British Columbia, with a single known collection from the eastern ranges, in Yellowstone National Park. It is interesting to speculate that the two species arose during early Eldoran time through isolation of similar populations at points far south of their present habitats. If this is true, the slight overlap of present distribution would indicate a northward movement to areas where the various mountain ranges are close together and intermingling occurs.

[1] Received April 25, 1950.

Genus **Rhyacophila** Pictet

Rhyacophila tucula, n. sp.

This species is a close relative of *alberta* Banks, differing most obviously in the proportions of the apical segments of the claspers; in *tucula* most of the brushlike dorsal portion of the apical segment extends beyond the end of the basal segment (Fig. 7), whereas in *alberta* (Fig. 6) this portion extends only a short distance beyond the end of the basal segment. In addition, the lateral arm of the aedeagus in *tucula* ends in a brush of dense setae (Fig. 2), and in *alberta* this region is expanded into a broad lobe bearing a fairly even pecten of stouter curved spines, beyond which the arm narrows again and bears a single long spine (Fig. 1).

Male.—Length from front of head to end of the folded wings, 12 mm. Color various shades of brown, darkest on the dorsum, the antennae, palps, and legs yellowish brown, the wings light brown and completely irrorate with a spotlike and barlike medium brown pattern. General structure typical for genus. Genitalia as in Fig. 7. Ninth segment short and annular except for the excavations to receive the bases of the claspers. Tenth tergite with dorsal sclerite narrow and humped, ending in a short, sharp projection; lateral sclerites only lightly sclerotized and ovate at apex; mesal sclerites ovate and projecting a short distance beyond lateral sclerites. Clasper with very long basal segment, which is nearly parallel-sided; apical segment much shorter, boot-shaped, with an angular heel and a moderately produced toe; mesal side of clasper bearing (1) a large sclerotized tendon which arises from the basal segment and joins the dorsal connective of the aedeagus, and (2) a pair of cushionlike areas of black spicules on the apical segment, as shown in Fig. 7A. Aedeagus consisting of a horseshoe-shaped dorsal connective, a short tubular base ending in a crenulate extensile apex, and arising from this is a pair of long, slender lateral arms and a mesal style containing the penis; the lateral arms bear a long comb of short spines which extend along the apical third of each arm (Fig. 2).

Female.—Size, color, and general structure as for male. Eighth segment (Fig. 3) with apex of venter produced and arcuate, apex of dorsum also produced, but more narrowly so, the segment considerably narrowed dorsoventrally toward apex. Spermatheca (Fig. 5) consisting of a somewhat bulbous, vasiform base and a long, slender, flattened apex, which is membranous ventrally and dorsally has a pair of lateral sclerotized bands extending from the middle of the process to and around the apex.

Holotype.—Male, Gardner River, Yellowstone National Park, Wyo., August 22, 1946, W. E. Ricker.

Allotype.—Female, same data.

Paratypes.—BRITISH COLUMBIA: Chilliwack Lake, Silver Creek, September 14, 1936, W. E. Ricker, 1 ♂. Cultus Lake, along Chilliwack River, August 25, 1934, W. E. Ricker, 1 ♂; same but September 9, 1937, 2 ♂. OREGON: McKenzie Bridge, September 21, 1934, R. E. Dimmick, 2 ♂, 2 ♀. WASHINGTON: Spirit Lake, July 20, 1947, C. P. Alexander, 1 ♂, 1 ♀. WYOMING: Same data as for holotype, 4 ♂.

Types in the collection of the Illinois Natural History Survey except the specimens from Spirit Lake, which are in the collection of D. G. Denning.

Rhyacophila alberta Banks

Rhyacophila alberta Banks, Bull. Mus. Comp. Zool. **62**: 21. 1918. ♂.

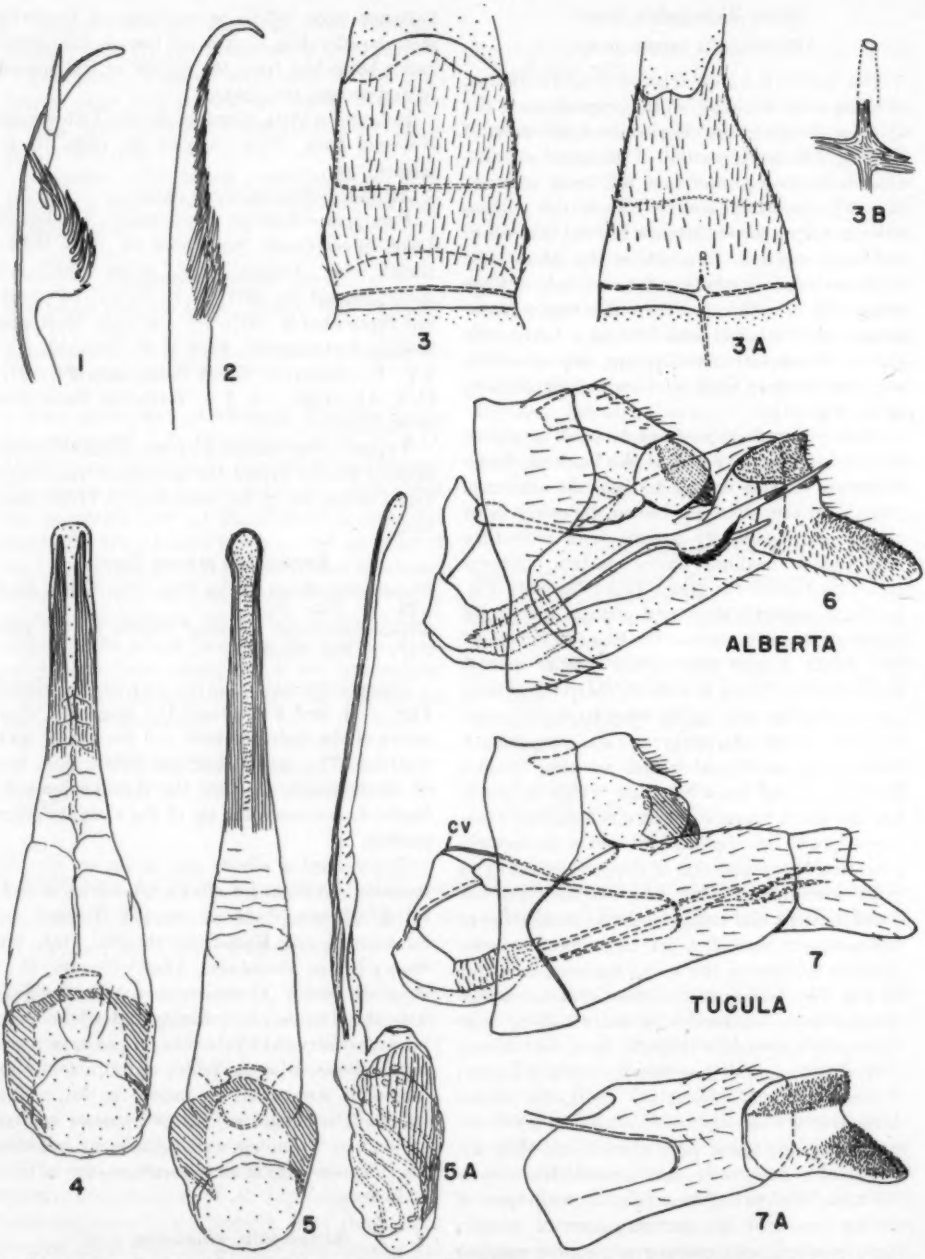
Rhyacophila mirus Denning, Psyche **55**: 21. 1948. ♂, ♀. New synonymy.

This species and *tucula* are very closely related. Figs. 1, 4, and 6 illustrate the diagnostic characters of the male genitalia and the female spermatheca. This latter structure differs from that of *tucula* chiefly in that the dorsal sclerotized bands do not reach the tip of the elongate apical portion.

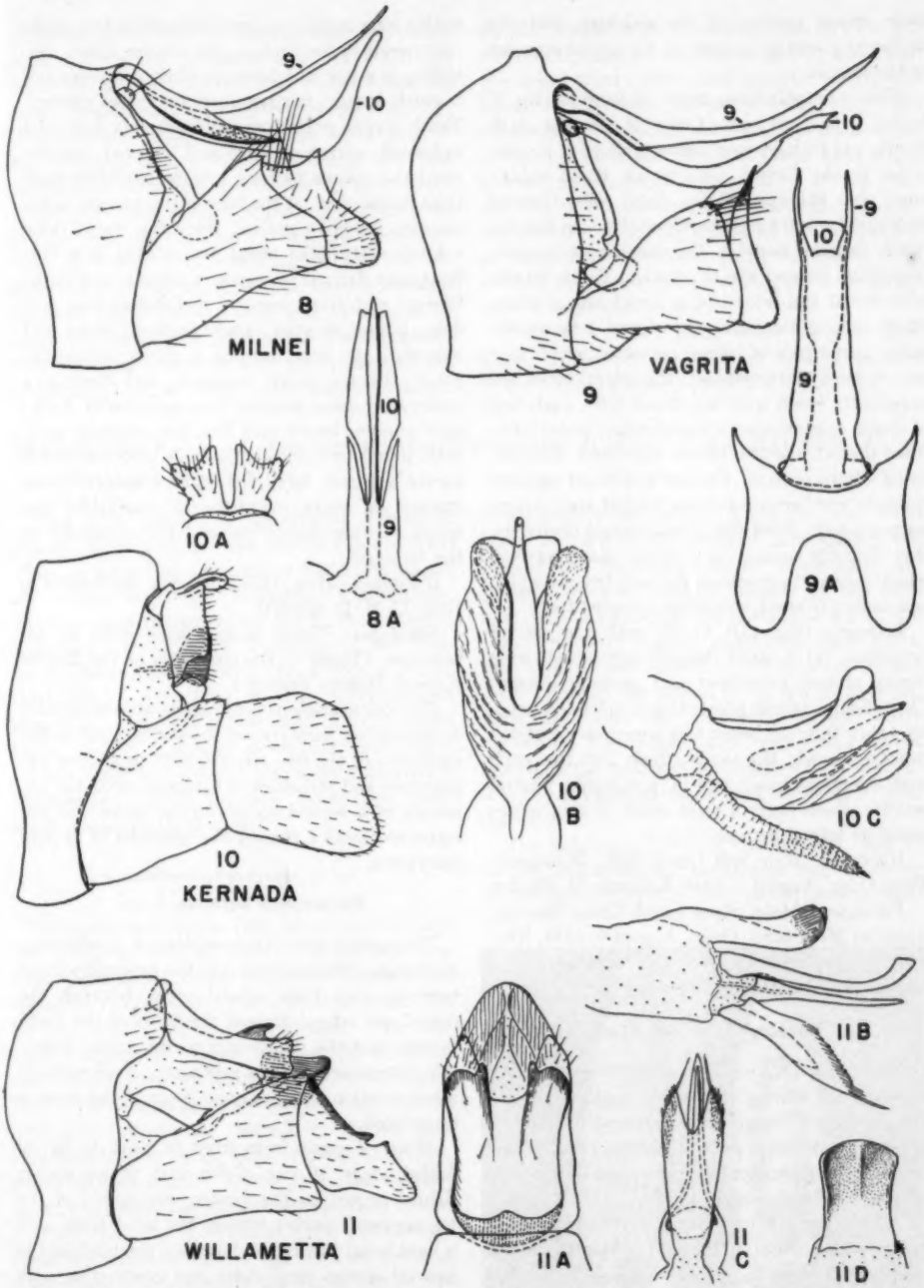
The ranges of *alberta* and *tucula* are very interesting. Records for *alberta* are available from Banff, Alberta (type of *alberta*); Tolland and Silverton, Colo.; Uintah Mountains, Utah; and Snowy Range Mountains, Albany County, Wyo. (type of *mirus*). Comparison of these localities with those for *tucula* indicates that *alberta* is apparently restricted to the eastern montane region of the West, whereas *tucula* appears to be the dominant species of the group in the western ranges. The ranges of the two species overlap, at least in Wyoming, and subsequent collecting may demonstrate that this occurs over a fairly wide area.

Rhyacophila willametta, n. sp.

This species is probably most closely related to *perda* Ross but differs markedly from it in the shape of every structure, especially the short,



FIGS. 1-7.—Parts of *Rhyacophila*: 1, *R. alberta* Banks, apex of lateral arm of aedeagus; 2, *R. tucula*, n. sp., apex of lateral arm of aedeagus; 3, *R. tucula*, ventral aspect of eighth segment of female; 3A, same lateral aspect; 3B, detail of apodeme; 4, *R. alberta*, spermatheca, dorsal aspect; 5, *R. tucula*, spermatheca, dorsal aspect; 5A, lateral aspect; 6, *R. alberta*, male genitalia, lateral aspect; 7, *R. tucula*, male genitalia, lateral aspect; 7A, inner face of clasper.



FIGS. 8–11.—Male genitalia of *Rhyacophila*: 8, *R. milnei*, n. sp., lateral aspect; 8A, eighth and ninth tergites, dorsal aspect; 9, *R. vagrita* Milne, lateral aspect; 9A, ninth and tenth tergites, dorsal aspect; 10, *R. kernada*, n. sp., lateral aspect; 10A, tenth tergite, dorsal aspect; 10B, same, main portion of aedeagus, ventral aspect; 10C, aedeagus, lateral aspect; 11, *R. willametta*, n. sp., lateral aspect; 11A tenth segment, dorsal aspect; 11B, aedeagus, lateral aspect; 11C, same, ventral aspect; 11D, same, dorsal aspect.

wide, dorsal process of the aedeagus and the declivous posterior margin of the apical segment of the clasper.

Male.—Length from front of head to tip of folded wings, 13 mm. Color of dorsum dark brown; appendages and venter yellowish brown; wings smoky brown with a few small lighter areas near the apex of the distal cells. General structure typical for genus. Genitalia as in Fig. 11. Ninth segment annular, the dorsal part longest, projecting beyond the remainder. Tenth tergite with dorsal and lateral lobes fused into a somewhat rectangular shelf, the dorsal lobe subdivided into a pair of lateral processes which project upward and posteriad; the lateral lobes are apparently fused with the dorsal lobe, each line of fusion appearing as a dorsal ridge; mesal lobes fused dorsad, the two halves separated ventrally by an elliptic opening. Clasper with basal segment elongate and becoming wider toward apex; apical segment fairly short, the dorsal margin declivous, this declivity ending in a short, sharp process which appears to represent the heel, beyond which is a moderate-sized, somewhat rounded toe.

Aedeagus (Fig. 11B, C, D) with four sets of processes: (1) A stout, heavily sclerotized, wide dorsal process excavated and carinate dorsad; (2) a single, broad, pointed, and upturned process below this; (3) below this a narrower, pointed process bearing the penis (these last two each with a bulbous base); and (4) a scooplike ventral process which bears a tight comb of thin spines along its lateral margin.

Holotype.—Male, Salt Creek Falls, Willamette Pass, Oreg., August 7, 1948, Kenneth M. Fender,

Paratype.—Male, Store Gulch Guard Station. Siskiyou Mountains, Oreg., August 9, 1948, Kenneth M. Fender. (Types in the collection of the Illinois Natural History Survey.)

Rhyacophila milnei, n. sp.

This species is a close relative of *vagrita* Milne, differing in having the apical segment of the clasper slightly longer and produced into only a short, broad point on the posterodorsal corner and in having the elongate projection of the ninth tergite trifid rather than bifid.

Male.—Length from front of head to tip of folded wings, 9 mm. Color light brown, the venter and appendages lighter, the wings very light brown and with only a faint indication of a pattern. General structure typical for genus. Male genitalia as in Fig. 8. Ninth segment annular, with a long mesal process arising from the posterior margin of the dorsum, this process trifid, consisting of a pair of lateral spiculate processes and a much longer, slender, fusiform mesal process. Tenth tergite with dorsal process very long and upturned, narrow at base and widened just beyond the middle to form a large spadelike apex from dorsal view; at the base of this process is the minute, knoblike cercus; from the dorsal lobe extends a straplike mesal arm ending in a bulbous apex flanked by a pair of small lateral flaps. Clasper with basal segment moderately long and deep, largest at apex; apical segment short and irregular, the heel forming a sharp, triangular point, the toe short, rounded, and bearing a moderately dense cushion of mesal spicules. Aedeagus simple, broad and flat, the extreme apex with a narrow, dorsal, beaklike process which curves ventrad; from the ventral margin there extends an ovate, membranous, tonguelike flap which extends slightly beyond the remainder of the aedeagus.

Holotype.—Male, Banff, Alberta, September 5, 1922, C. B. D. Garrett.

Paratypes.—Three males, same data as for holotype. (Types in the collection of the Illinois Natural History Survey.)

The four specimens listed above were originally designated as paratypes of *vagrita*. So great is the similarity of the two species, both in general appearance and structure of genitalia, that the existence of a second species in the series was not suspected until I cleared the genitalia of several specimens.

Rhyacophila kernada, n. sp.

This species is a very close relative of *coloradensis* Banks, differing from it in the extremely small incision, seen from lateral view, between the dorsal and lateral flaps of the lobes of the tenth tergite, and the completely membranous, spiculate, lateral arms of the aedeagus. In *coloradensis* a long portion of the apex of these lateral arms is sclerotized.

Male.—Length from front of head to tip of folded wings, 10 mm. Color dark brown above, lighter brown on the venter, the apices of the leg segments darker brown, the front tibia with a light band just beyond middle, the hind legs in general almost straw-color and contrasting with the light brown of the front and middle legs. Wings with irregular irrorate pattern, with a lighter and somewhat bandlike area on the ante-

rior portion basad of the stigma. General structure typical for genus. Genitalia as in Fig. 10. Ninth segment annular, the dorsum higher than the tenth tergite, and with a steep apical declivity. Tenth tergite composed of (1) a dorsal pair of earlike lobes, each with a small dorsal and deep lateral flap, (2) a mesal pair of heavily sclerotized, closely appressed sclerites appearing bulbous from lateral view and together circular from posterior view, (3) a very small, ovate sclerite with a short, sclerotized, mesal apodeme, this sclerite situated between the preceding two, and (4) a pair of small ventral lobes which unite below this entire structure and articulate with the dorsum of the aedeagus. Clasper with both segments about equal in length, depth, and area, both rhomboidal, the apical segment slightly incised at apex with the apical third of the mesal aspect covered with small black spicules. Aedeagus beyond basal tube consisting of a central sclerotized portion which at the apex has a pair of lateral knobs and a single slender, mesal, beaklike projection; arising from the base of this structure a large U-shaped semimembranous flap; and, arising at the base, a pair of membranous extensile arms, the apical third clothed with dense, pale spicules, the extreme tip with a single sharp spine.

Holotype.—Male, Kern River, Road's End, Calif., September 25, 1940, at light. Deposited in the United States National Museum.

MALACOLOGY.—*A new terrestrial mollusk from Mexico.*[1] PAUL BARTSCH, U. S. National Museum.

The new species of gastropod described below, belonging to the genus *Coelostemma* Dall, is based on specimens collected about 29 miles west of Jiménez, Chihuahua, Mexico, and presented to the U. S. National Museum by George F. Freytag, of the Missouri Botanical Garden. Mr. Freytag states that while collecting in the Chihuahuan desert he came upon this snail and brought back about a dozen examples. He says: "They seem to be night travelers and attach themselves during the day by sealing their shell openings to the cliff."

Coelostemma freytagi, n. sp.

Shell elongate-conic, pale horn-colored, with the peristome almost white. The nucleus consists of about 2¼ turns, which are inflated and strongly rounded and form a bulbous apex. The nuclear whorls are finely granulose. The first eight postnuclear whorls increase gradually in size; the rest form a cylindric spire, which becomes very slightly contracted toward the base. All the postnuclear turns are crossed by strong, sublamellar, hollow, retractively curved axial ribs, which extend equally strong from the summit of the periphery. The ribs are separated by spaces that are not quite constant in width but average about 1½ times as wide as the ribs. On the first postnuclear whorls the ribs are feeble, but on the second turn 20 strong ribs are present. On the tenth turn there are 26, while the last whorl bears 16 plus a few wrinkles immediately adjoining the peristome. Suture moderately impressed, rendered slightly sinuous by the axial ribs. Last whorl solute for about one-tenth of a turn. Periphery slightly angulated. Base short, well rounded, and crossed by the axial ribs, which extend slightly diminished to the umbilical chink. Aperture subcircular. Peristome broadly flatly expanded. The columella is very broad, about one-third the width of the inside of the whorls; it is smooth and glistening and shows faint axial markings.

The holotype, U.S.N.M. no. 601851, has 18 whorls, and measures: Length, 18 mm; diameter of middle turns, 4 mm. Five paratypes are listed as U.S.N.M. no. 601852.

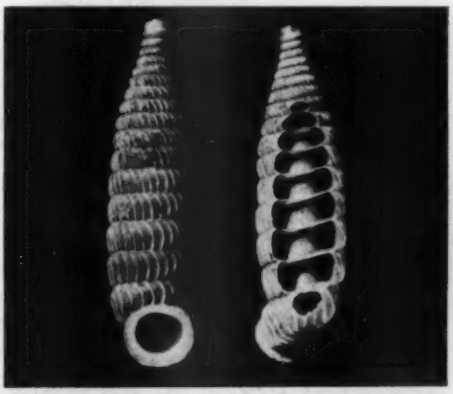


FIG. 1.—*Coelostemma freytagi*, n. sp.

[1] Received May 8, 1950.

ICHTHYOLOGY.—*Notes on the blennioid fish genera* Runula (*subfamily Petroscirtinae*) *and* Tripterygion *and* Helcogramma (*family Clinidae*), *of the American tropical Pacific.*[1]

LEONARD P. SCHULTZ, U. S. National Museum.

During my recent studies of the blennies of the Marshall Islands, it was necessary to examine some of the American species in the subfamilies Petroscirtinae and Clinidae. The following notes should help clarify the species and nomenclatorial status of several genera and species of American blennies.

PETROSCIRTINAE

The family Atopoclinidae is listed in Jordan, Evermann, and Clark's *Check list of the fishes and fishlike vertebrates of North and Middle America. . .* (Rep. U. S. Comm. Fish 1928, pt. **2:** 465. 1930). Norman (Ann. Mag. Nat. Hist. (2) **10:** 793. 1933) referred the genus *Atopoclinus* Vaillant with uncertainty to the blennioid genus *Aspidontus* Quoy and Gaimard. My study of the genotypes of *Aspidontus* and of *Runula* revealed that there were two groups of species representing two different phylogenetic lines and that all the American Pacific species belonged to the *Runula* group including *Atopoclinus*. After carefully studying all the material in the U. S. National Museum referable to the two genera mentioned, it was concluded that *Runula* was distinct and should be removed from the synonymy of *Aspidontus* as defined by Norman, 1943, on the basis of the following characters:

1*a*. Pectoral rays usually 14; incisorlike teeth of lower jaw approximately equal in number and in size to those of upper jaw. *Aspidontus*

1*b*. Pectoral rays usually 12; incisorlike teeth of lower jaw notably twice or nearly twice as numerous and about half as wide as those in upper jaw. . . . . *Runula*

Genus **Runula** Jordan and Bollman

Runula Jordan and Bollman, Proc. U. S. Nat. Mus. **12:** 171. 1890 (genotype, *Runula azalea* Jordan and Bollman).

Atopoclinus Vaillant, Bull. Soc. Philomat. Paris (3) **6:** 73. 1890 (genotype, *Atopoclinus ringens* Vaillant).

So far in the tropical American Pacific but two species of *Runula* have been found. They may be distinguished by the following key, aided by table 1:

[1] Published with permission of the Secretary of the Smithsonian Institution. Received May 8, 1950.

TABLE 1.—COUNTS MADE ON CERTAIN SPECIES OF RUNULA

Species	Number of fin rays														
	Dorsal							Anal					Pectoral	
	VII	VIII	IX	31	32	33	34	35	II	27	28	29	30	12	13
ringens	1	4	1	1	1	1	1	2	5	2	2	1	—	3	1
azalea	1	5	—	1	—	1	3	1	5	—	1	3	1	8	—

Species	Number of incisorlike teeth														
	Lower jaw								Upper jaw						
	41 42	43 44	45 45	47 48	49 50	51 52	53 54	55 56	21 22	23 24	25 26	27 28	29 30	31 32	
ringens	—	—	—	—	—	—	2	1	—	—	1	—	—	2	
azalea	1	2	1	—	1	—	—	—	1	2	—	—	—	—	

1*a*. Sides with a dark brown band, usually broken into more or less distinct small blotches posteriorly, then continuing on caudal fin, tapering to a point at rear end of middle rays of caudal fin; dorsal fin with a median black band, white-edged distally, and basally pale. . . . . *R. ringens* (Vaillant)

1*b*. Dark lateral band if present usually indistinct, not continuing to rear of caudal fin but ending in a small dark spot basally; sides and especially dorsal fin, with 6 dark bars; anal with 4 dark bars; no dark band in dorsal fin. *R. azalea* Jordan and Bollman

The nomenclature for the two species follows:

Runula ringens (Vaillant)

Atopoclinus ringens Vaillant, Bull. Soc. Philom. Paris (3) **6:** 74. 1890 (type locality, Gulf of California).

Runula albolinea Nichols, Zoologica **5** (4): 64, fig. 11. 1924 (type locality, Galápagos Islands).

Petroscirtes panamensis Fowler, Acad. Nat. Sci. Philadelphia Monogr. **6:** 291, fig. 246. 1944 (Pearl Islands).

Runula azalea Jordan and Bollman

Runula azalea Jordan and Bollman, Proc. U. S. Nat. Mus. **12:** 171. 1890 (type locality, Galápagos Islands).

Petroscirtes belanskei Borodin, Bull. Vanderbilt Oceanogr. Mus. **1** (1): 33, pl. 3, fig. 3. 1928 (type locality, Costa Rica).

I have compared the figure of *P. belanskei* with the holotype of *R. azalea*, U.S.N.M. no. 44299,

and have no doubt that it is the same species as *azalea*.

CLINIDAE

My study of the numerous species of the world centering around the genera *Tripterygion*, *Enneapterygius*, and *Enneanectes* of authors indicated much confusion in regard to both genera and species. I did not find a review of the genera or of some 49 species already named for this group of fishes. Therefore, in order to come to some conclusion as to what genus to refer certain species that I was studying in the Marshall Island material, it was necessary to survey all the genotypes so far proposed. The following key though tentative is intended to help define the genera as observed by me in the literature:

1*a*. First dorsal with III to VII spines, notably separated from second spiny dorsal fin, or membrane incised to base forming 2 distinct spiny dorsal fins.

2*a*. First dorsal fin with V to VII spines, second dorsal with about XIX to XXII spines; anal with about II, 25 to 27; pectoral rays about 17 to 19; vertical scale rows about 60 to 65; lateral line, anteriorly, separated from base of second spiny dorsal by 5 or 6 scales; breast scaly; head naked.
Forsterygion Whitley and Phillipps[2]

2*b*. First dorsal fin with III or IV spines; second with X to XVII; dorsal soft rays 6 to 15; anal I or II, 13 to 26; scales in about 20 to 45 vertical rows.

3*a*. Lateral line represented by pores anteriorly, and convexly curved above pectoral fin, separated by 2 to 5 scales from base of spiny dorsal fins, and ending from opposite base of second dorsal to that of front of base of soft dorsal, thence commencing 1 or 2 scales below and continuing as notched scales along midlengthwise axis of body.

4*a*. Pectoral rays 14 to 16; 2 or 3 scales between anterior lateral line and base of second dorsal; first dorsal usually with III spines, rarely IV.
Tripterygion Risso

4*b*. Pectoral rays usually 11; 4 or 5 scales between anterior lateral line and base of second dorsal; dorsal rays IV-X-12 or 13; anal I, 22 or 23; lateral-line pores 15 + 25.....*Notoclinus* Gill[3]

3*b*. Lateral line concavely curved downward behind pectoral fin, separated by 4 to 8 scales from base of second spiny dorsal fin, thence continuing along midlengthwise axis of body, the last scales sometimes notched posteriorly.
Helcogramma McCulloch and Waite

1*b*. First dorsal of III or IV spines, separated from following spines by a notably wider than usual space, but membrane continuous, forming a single spiny dorsal fin; no cirri on eye or on nape; dorsal rays about III, XIV-12; anal II, 17; head naked, about 7 scales in a row from lateral line and middle of base of spiny dorsal; lateral line curving downward behind pectoral fin, thence extending along midlengthwise axis of body.
Lepidoblennius Steindachner[4]

As a result of the generic analyses of various species of the fishes in this relationship, it was observed that the American species were little understood and were greatly confused. In order to clarify the status of the genus *Enneanectes*, all the American species were compared. I am grateful to J. Bökle, for data supplied on specimens in the Stanford Museum collections, especially for the holotype of *E. storeyae* Brock. The following analysis of America genera and species, it is hoped, will aid those who may wish to identify species in the genera *Tripterygion* and *Helcogramma:*

1*a*. Lateral line represented by pores anteriorly and convexly curved above pectoral fin, separated by 2 to 4 scales from base of second spiny dorsal fin, and ending from opposite base of second dorsal to front of base of soft or third dorsal, thence commencing 1 or 2 scales below and continuing as posteriorly notched scales, along midlengthwise axis of body (*Tripterygion*).

2*a*. Dorsal rays about III–XIII to XV-13 or 14; anal II, 21; pectoral 17 or 18; pores in lateral line 27 + 12; about 3 or 4 scales above lateral line to base of second dorsal and at beginning of posterior lateral line about 3 scales to base of anal fin; head with scales, breast partly scaled; about 14 scales in a zigzag row around caudal peduncle.
Tripterygion corallicola (Kendall and Radcliffe)

2*b*. Dorsal rays about III–X to XIII-6 to 8; pectoral usually 15; about 2 scales above

[2] *Forsterygion* Whitley and Phillipps, Trans. Roy. Soc. New Zealand **69** (2): 236. 1939 (genotype, *Blennius varius* Bloch and Schneider = *Tripterygion nigripenne* Cuvier and Valenciennes), probably = *Tripterygion capito* Jenyns, Zoology voyage *Beagle*, pt. 4, Fish: 94–95, pl. 19, fig. 1. 1842 (Bay of Islands, New Zealand).

[3] *Notoclinus* Gill, Mem. Nat. Acad. Sci. **6**: 95, 124. 1893 (genotype, *Tripterygion fenestratum* = *Blennius fenestratus* Bloch and Schneider). Gill based the genus *Notoclinus* on a large specimen of *fenestratum* from New Zealand (U.S.N.M. No. 39672); it measures 180 mm. in standard length.

[4] *Lepidoblennius* Steindachner, Sitzb. Akad. Wiss. Wien **55**: 3. 1867 (genotype, *Lepidoblennius haplodactylus* Steindachner).

dorsal lateral line and base of second dorsal and 2 or 3 scales between posterior lateral line and anal-fin base; zigzag scales around caudal peduncle 8 or 9.

3*a*. Area in front of anal fin usually completely or partly scaled; normally a few scales on head of adults; dorsay rays III–XI or XII-6 or 7; anal usually I, 16; pores in lateral lines about 13 + 17 to 19.

Tripterygion jordani (Evermann and Marsh)

3*b*. Area in front of anal fin naked; head naked; dorsal rays usually about III-X-8, anal probably about I, 16; pores in lateral line 10 + 21.

Tripterygion sexmaculatus Fowler

1*b*. Lateral line concavely curved downward behind pectoral fin and continuing along midlengthwise axis of body, separated by 4 to 8 scales from base of second spiny dorsal fin, and 4 to 8 scales from anal origin (*Helcogramma*); dorsal rays III–XI or XII-9 or 10; anal II, 16 or 17; pectoral 15 or 16; about 30 to 34 pores in lateral line, 4 or 5 scales between lateral line and base of second dorsal, and about 4 scales between lateral line and anal fin base; head and breast naked; 12 to 15 scales in a zigzag row around caudal peduncle.

Helcogramma carminale (Jordan and Gilbert)

The synonymy of various genera and species follows:

Genus **Tripterygion** Risso

Tripterygion Risso, Hist. Nat. Eur. Merid. **3**: 241. 1826 (genotype, *Tripterygion nasus* Risso); sometimes amended to *Tripterygium* of authors.

Enneapterygius Rüppell, Neue Wirbeth. Abyssinia, Fische: 2. 1835 (genotype, *Enneapterygius pusillus* Rüppell).

Enneanectes Jordan and Evermann, *in* Jordan, Proc. California Acad. Sci. (2) **5**: 501, pl. 53. 1895 (genotype, based on pl. 53, "*Enneanectes carminalis*" not of Jordan and Gilbert = *Gillias sexmaculatus* Fowler, 1941). *Tripterygium carminale* Jordan and Gilbert, holotype U.S.N.M. no. 120946, was found by me with the types of *Gobiesox zebra* in 1944 and belongs to another genus (see *Helcogramma*) as indicated in this study.

Gillias Evermann and Marsh, Rep. U. S. Fish Comm. **25** (1899): 357. 1900 (genotype, *Gillias jordani* Evermann and Marsh).

Trianectes McCulloch and Waite, Rec. South Austr. Mus. **1** (1): 53, 1918 (genotype, *Trianectes bucephalus* McCulloch and Waite).

Notoclinops Whitley, Mem. Queensland Mus. **10**: (1) 20. 1930 (genotype, *Tripterygion segmentatum* McCulloch and Phillips).

Verconectes Whitley, Austr. Zool. **6** (1): 324. 1931 (genotype *Tripterygion bucephalus* McCulloch and Waite; proposed to replace *Trianectes*, said erroneously by Whitley to be preoccupied).

Vauclusella Whitley, Austr. Zool. **6** (4): 324. 1931 (genotype, *Tripterygion annulatum* Ramsey and Ogilby).

Tripterygion corallicola (Kendall and Radcliffe)

Enneapterygius corallicola Kendall and Radcliffe, Mem. Mus. Comp. Zool. **35** (3): 153, pl. 7, fig. 1. 1912 (type locality, Chatham Island, Galápagos; holotype, U.S.N.M. no. 65484).

Tripterygion jordani (Evermann and Marsh)

Gillias jordani Evermann and Marsh, Rep. U. S. Fish Comm. **25** (1899): 357. 1900 (type locality, Puerto Rico; holotype, U.S.N.M. no. 49368; paratypes, U.S.N.M. no. 126096).

Enneapterygius pectoralis Fowler, Proc. Acad. Nat. Sci. Philadelphia. **93**: 96, figs. 10–12. 1941 (type locality, Sanibel Island, Fla.).

Tripterygion sexmaculatus (Fowler)

Enneanectes carminalis (not Jordan and Gilbert) Jordan, Proc. California Acad. Sci. (2) **5**: 501, pl. 53. 1895 (Mazatlán) Stanford Univ. no. 3854. Brock, *l,c.*).

Gillias sexmaculatus Fowler, Acad. Nat. Sci. Philadelphia Monogr. 6: 286, fig. 241. 1941 (type locality, Pearl Islands, Panama).

Genus **Helcogramma** McCulloch and Waite

Helcogramma McCulloch and Waite, Rec. South Austr. Mus. **1**: 51. 1918 (genotype, *Helcogramma decurrens* McCulloch and Waite).

Azoclinus Fowler, Acad. Nat. Sci. Philadelphia Monogr. 6: 288. 1941 (genotype, *Azoclinus lucillae* Fowler = *Tripterygium carminale* Jordan and Gilbert, holotype U.S.N.M. no. 120946, found by Schultz with the types of *Gobiesox zebra* and not lost as published by Fowler (ibid.) and by Brock (Stanford Univ. Bull. **2** (1). 1940); Fowler's misspelling on p. 388, fig. 242, *Azochnus*, a typographical error.

Helcogramma carminale (Jordan and Gilbert)

Tripterygium carminale Jordan and Gilbert, Proc. U. S. Nat. Mus. **4**: 362. 1882 (type locality, Mazatlán; holotype, U.S.N.M. no. 120946).

Enneapterygius storeyae Brock, Stanford Ichth. Bull. **2** (1): 33. 1940 (type locality, Cape San Lucas; holotype, S.U. no. 35045).

Azoclinus lucillae Fowler, Acad. Nat. Sci. Philadelphia Monogr. 6: 289, fig. 242. 1941 (type locality, Pearl Islands, Panama).

The "neotype" Stanford University no. 3854 by Brock, 1940, does not belong to this genus and species but is a specimen of *Tripterygion sexmaculatus* (Fowler).

ICHTHYOLOGY.—Ichthyocampus pawneei, *a new pipefish from the Bahamas.*[1]

EARL S. HERALD, Steinhart Aquarium, California Academy of Sciencies. (Communicated by L. P. Schultz.)

In the syngnathid section of the forthcoming Bikini report, the writer presents a partial treatment of the 15 species in the genus *Ichthyocampus*. Fourteen of these, including two that are new, are limited to the Indo-Pacific region. The fifteenth member is also new and is the only species of the genus to occur in the Atlantic. It is described in this preliminary paper in order to avoid description in the Bikini report, which deals primarily with Central Pacific fishes.

Ichthyocampus pawneei, n. sp.

Holotype.—Bingham Oceanogr. Coll. no. 3327, 22 mm, juvenile, taken at Guen Cay, Bahamas, by the *Pawnee*, station 6, surface, February 27, 1927.

Diagnosis.—Dorsal fin rays 26; pectoral 10–11 (?); anal 0; caudal 8 (?); dorsal fin covering 1 trunk ring and 9½ tail rings; trunk rings 17; tail rings 32; head in standard length 7.6; dorsal in head 0.72; snout in head 3.22; lateral trunk ridge continuous with inferior tail ridge; superior trunk and tail ridges continuous; inferior trunk and tail ridges discontinuous; and lateral tail ridge absent, as is characteristic of *Ichthyocampus*.

Description.—The top of the very short snout is raised to a dulled ridge and forms a distinct hump between the maxillary and interorbital area. At the interorbital area the snout ridge branches and is continuous with the markedly elevated anterior supraorbital ridges, and thus a conspicuous Y is formed by these three structures. Prenuchal and nuchal ridges are barely visible, and the opercular ridge extends faintly for about one-half of the length of the opercle. All other head ridges are absent, including the posterior supraorbitals as well as those usually found on the pectoral cover plate. The trunk and tail ridges are slightly raised, but the body angles are distinct and are not rounded. The scutella are quite large and in width are equal to the distance between the nearest edges of the adjacent scutella, or to 1½ times that distance. The pectoral fins are very small and are equal in length to approximately the width of a single trunk ring. No cirri are present.

This species is named in honor of the collecting ship, the *Pawnee*.

[1] Received May 8, 1950.

MAMMALOGY.—*Validity of the subspecies* Enhydra lutris nereis, *the southern sea otter.*[1]

VICTOR B. SCHEFFER and FORD WILKE, U. S. Fish and Wildlife Service. (Communicated by Herbert Friedmann.)

The sea otter at one time occupied the rim of the northern Pacific Ocean and the southern Bering Sea from the islands of Guadalupe and Natividad, Lower California, to the Pribilof Islands, Alaska, and Hokkaido, Japan. It is now restricted to southern California (several hundred animals), British Columbia (occurrence doubtful), continental Alaska (several hundred), the Aleutian Islands (several thousand), the Commander Islands (perhaps a thousand), and the Kurile Islands (several hundred to several thousand). The former range of the sea otter was, with the exception of a 200-mile gap of open water between Attu and Copper islands, a continuous sweep.

In 1904, C. Hart Merriam described the sea otter of southern California as a "well-marked subspecies," *Latax lutris nereis*, on the basis of a single skull from the Channel Islands (Proc. Biol. Soc. Washington **17:** 159). In 1930, Joseph Grinnell compared the type of *nereis* with "an example . . . of the same sex and age" from the Aleutian Islands and found differences that led him to regard the southern subspecies as valid (*Fur-bearing mammals of California*: 287. 1937). We have reexamined the specimens used by Merriam and Grinnell and have compared them with material from Alaska, Washington, Oregon, and California. Our total collection includes 56 adult skulls.

[1] Received May 3, 1950.

SKULL CHARACTERS

The diagnostic features of *nereis* as set forth by Merriam, followed by our own comments, are given below.

1. "Skull large, broad, and high, with long and high sagittal crest and swollen braincase." We find, however, that southern specimens tend to be slightly *smaller* than northern ones:

CONDYLOBASAL LENGTH IN MILLIMETERS

Locality	Males			Females		
	N	Mean	Range	N	Mean	Range
Western Alaska	8	140	130-145	3	131	131-131
Washington and Oregon	2	135	133-137[1]	2	129	126-133[2]

[1] Including the type of *nereis*, condylobasal length 133 mm.
[2] Including a very old animal (A.M.N.H. No. 28226), which is certainly a female, although the sex is not recorded.

Grinnell, too, states that "the general size of the type of *E. l. nereis* is decidedly smaller [than an Aleutian skull of comparable age] and the brain case is relatively higher" (*op. cit.*: 287–288). Grinnell's analysis of the difference between two adult male skulls, one the type of *nereis* (U.S.N.M. no. 133508) and one from Kiska, Alaska (U.S.N.M. no. 13222), is good. Perhaps inadvertently, though, he selected as a typical Alaskan skull an extremely large one. Out of 43 skulls of adult male, and sex-unknown, sea otters from Alaska, specimen no. 13222 is exceeded in size by only one.

We find that southern sea-otter skulls (with the exception of Merriam's type) are no higher than northern ones. The height measurement is a difficult one to take and is unsatisfactory because of irregularities on the skull.

2. "Anterior part of zygomata more broadly and squarely expanded." We are unable to see a consistent difference between northern and southern skulls.

3. "Basioccipital forming an angle with basisphenoid." The meaning of this statement is not clear. Perhaps Merriam meant the angle formed by the planes of the two bones. In subadult northern as well as southern skulls, the plane of one bone usually forms an angle with the plane of the other. After the suture has knit, the angle or convexity tends to disappear, and the two bones to align themselves in the same plane.

4. "Coronoid processes sloping strongly backward." We have sketched the left process in six adult skulls of similar size (Fig. 1). One California specimen (Fig. 1, *a*) shows a definite backward slope; another (Fig. 1, *d*) does not.

5. "Sagittal crest much higher and more decurved posteriorly." The height of the sagittal crest is a poor diagnostic character because it varies so greatly with age and because it is difficult to measure. The evidence offered by the crest is thus inconclusive.

Locality	Males		Females	
	Condylobasal length	Height of sagittal crest	Condylobasal length	Height of sagittal crest
Western Alaska	140[1]	7.6[1]	133[2]	5
			131	5
			131	6
			131	4
Oregon and California	137	3	132[2]	9
			127	4

[1] Mean of 7 specimens, CBL 139–142; HSC 7–8.
[2] Quite certainly a female.

6. "Inner cusp of large upper premolar (*pm 3*) elongated along anterior part of inner lobe (instead of conical) and showing a tendency to subdivide into two parts." This is a peculiarity of the type specimen. Merriam's "*pm 3*" is presumably Miss Fisher's "*PM 4*" (Journ. Mamm. **22:** 429. 1941).

7. "1st lower molar broader and more broadly truncate posteriorly." We are unable to see these differences. Grinnell suggests as a diagnostic

Locality	Males		Females	
	Condylobasal length	Width of molar	Condylobasal length	Width of molar
FIRST LOWER MOLAR				
Western Alaska	140[1]	13.0[1]	131	13.0
			131	12.8
			131	12.7
Oregon and California	137	13.1	133[2]	13.0
			127	13.0
LAST UPPER MOLAR				
Western Alaska	139[3]	20.3[3]	131	19.3
			131	19.1
			133[4]	20.9
Oregon and California	137	20.0	133[2]	20.6
	133	21.0	126	18.5

[1] Mean of 7 specimens, CBL 139-142 and WM 12.6-13.8.
[2] Quite certainly a female.
[3] Mean of 7 specimens, CBL 139-142 and WM 19.7-21.1.
[4] The type of *nereis*.

feature of the southern sea otter the greater width of the last upper molar. In 14 specimens available to us, however, this is not demonstrable. Regardless of sex or locality, the fully adult upper molar is about 20–21 mm. in diameter.

BODY LENGTH

Merriam states that the type "specimen in the flesh measured 6 feet in length." This is unquestionably an error. Stephens (*California mammals*: 233. 1906) describes the size of the California sea otter as "length about 1200 mm (48 inches)." Miss Fisher (California Fish and Game **26:** 281. 1940) gives the size of two subadult males from California as: Length in millimeters, 1,313 and 1,270 [inches, 51.7 and 50]; weight in pounds, 65 and 63. To the best of our knowledge, the largest Aleutian sea otter on record, a male we collected in 1947, had a length of 58 inches. Since there appear to be no authentic measurements of an adult sea otter from the California, Oregon, or Washington coasts, it is impossible at the present time to compare the sizes of northern and southern animals.

PELAGE

Merriam did not mention pelage in his description of *nereis*, since he had only a skeleton to work with. Chase Littlejohn, who formerly hunted sea otters in Alaska and California, says that on the southern animal "the fur is just as pretty but shorter" (*fide* Hall, in Journ. Mamm. **26:** 91. 1945). From Stevenson (Rep. U. S. Comm. Fish and Fisheries for 1902: 321. 1904) we quote, as follows:

> The color of the pelt varies considerably, the predominant shade being lustrous brown brightened with silvery overhairs. Some pelts are a deep brown or a brownish black, and are known in the trade as 'black.' Others are brown, with a tendency toward bluish green or dark-plum color, and are known as 'dark.' The fur is in all cases lighter on the abdomen than on the back. The hair on the head is lighter in color, and is light brown in the brown variety, but in the black animals it is almost completely white, the effect of the large number of white overhairs. The skins from British Columbia, Washington, and Oregon are frequently of a yellowish-brown hue, and albino skins have been taken rarely.

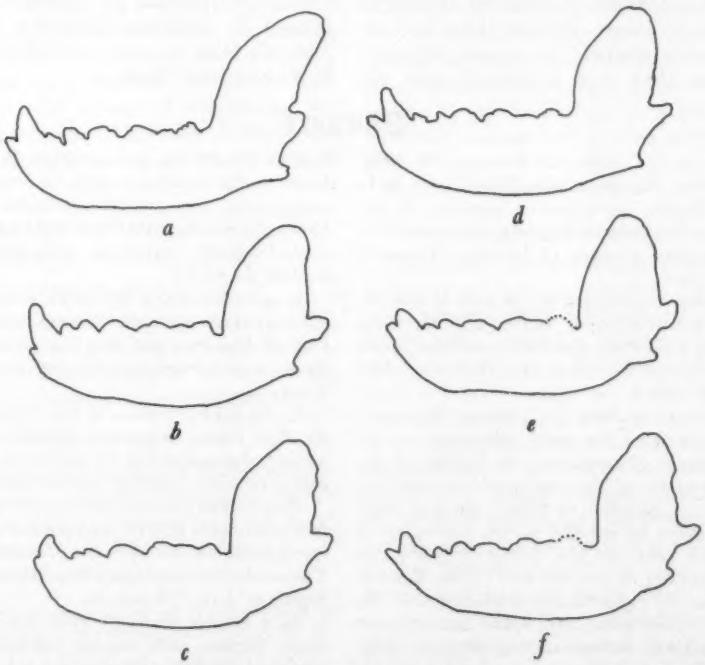


FIG. 1.—Left coronoid processes in six adult sea otters: *a*, California male, C.M.V.Z. no. 84812; *b*, Alaska male, ECH 95; *c*, Alaska male, ECH 21–48; *d*, California (female?), A.M.N.H. no. 28226; *e*, Alaska female, ECH 34; *f*, Alaska (female?), ECH 20–48.

Here is evidence of a color difference between sea otters inhabiting northern and southern waters. Whether it is valid throughout the seasons of the year we can not say. (In the Alaska fur seal, pelagic specimens taken in winter and spring are consistently grayer than those taken in summer, which are browner.)

CONCLUSIONS

In sea otters from California and Oregon the skull size is slightly smaller, and the coronoid processes may perhaps slope more strongly backward, than in sea otters from western Alaska. We have for study, however, only eight adult skulls from the southern region, three of them known-sex and five unknown. For lack of measurements, body size in northern and southern animals can not be compared at the present time. There is testimony that the pelage of sea otters inhabiting the warmer waters is relatively shorter and more yellowish. Some of the features described by Merriam in 1904 as diagnostic of the subspecies *nereis* are applicable to the type specimen alone, while others are applicable to northern as well as southern individuals. Though there may be a north-south gradient in certain features, we suspect that it is a smooth and uninterrupted one. Were we handed a skull from an unknown source we could not, with confidence, assign it to its proper locale. Neither on the basis of demonstrable variation nor on the grounds of geographical isolation is there support for a southern subspecies of the sea otter.

SPECIMENS EXAMINED

Fifty-six adult skulls, that is, with basi-occipital-basisphenoid suture closed: CALIFORNIA, 5 (1 male, U.S.N.M.; 1 male, C.M.V.Z.; 2 sex-unknown, U.S.N.M.; 1 sex-unknown, A.M.N.H. OREGON, 2 (1 female, U.S.N.M.; 1 sex-unknown, U.S.N.M.). WASHINGTON, 1 (1 sex-unknown, U.S.N.M.). SOUTHEASTERN ALASKA, 2(1 sex-unknown, U.S.N.M.; 1 sex-unknown, C.M.V.Z.). WESTERN ALASKA, 46 (9 males, 3 females, 34 sex-unknown, U.S.N.M.).

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Obituary

CARLOS DE LA TORRE.—On February 19, 1950, at his home in Havana, Cuba, Don Carlos de la Torre y Huerta, an honorary member of the Washington Academy of Sciences, terminated his mundane career, a victim of America's foremost malady, cancer.

Some achieve greatness in the field of science, education, government, or politics, but it is rarely that one finds all these qualities combined in one individual, as was the case in Don Carlos—Cuba's grand great man.

He was born on May 15, 1858, in Matanzas, where he received his early education in his father's colegio. He continued his studies at the Royal University of Havana, where he received the degree of "bachiller de artes." He next went to Spain, where he enrolled at the University of Madrid and achieved the degree of doctor en ciencas naturales on November 1, 1883. Returning to Cuba, he again became affiliated with the university, which later, after Cuba had achieved its independence, abbreviated its title to "University of Havana." Here he enrolled for the degrees of doctor of medicine and pharmacy, while occupying an assistantship. From this he advanced steadily to professorship, deanship, and finally to the presidency of the university—a most conspicuous, able, and beloved figure in each post. His many contributions and textbooks to Cuba's graded schools carried his name to every house hold in the island.

In government he served his country on various important committees as well as mayor of the City of Havana; also as a representative of his government to various congresses in America and Europe.

In the field of science he was Cuba's most outstanding figure. His many contributions to malacology, his major but by no means only field of endeavor, have received world-wide recognition.

Don Carlos was the recipient of many honors bestowed upon him by educational and scientific institutions in Europe and America. Harvard University bestowed upon him, honoris causa, the degree of doctor of science.

As a person, we may say of him that he was frank, fearless, able, helpful, and lovable—a man who made friends wherever he went, whose genial presence will be missed by all who knew him.

PAUL BARTSCH.